

SANDHILL FIRE

Burned Area Emergency Rehabilitation (BAER) Plan

AGENCY/UNIT: Fish and Wildlife Service, Bitter Lake National Wildlife Refuge

LOCATION: Roswell, Chaves County, New Mexico

FIRE DATE: March 5-6, 2000

PREPARED BY: Thomas M. Gavin
Fire Management Officer, Pecos Fire Management Complex



Submitted By: _____ **Date:** _____
Refuge Manager, Bitter Lake NWR

EXECUTIVE SUMMARY

Introduction

This plan has been prepared in accordance with a memorandum and attachments (*Final Policy Decisions*) from the Assistant Secretary of the Interior, Policy, Management and Budget, dated April 27, 1998; Subject: Policy Guidance and Direction, Wildland Fire Rehabilitation and Restoration. The rehabilitation objectives of the Sandhill Fire Burned Area Emergency Rehabilitation (BAER) Plan are:

- ! To prescribe post-fire mitigation measures necessary to protect human life, property, and critical cultural and natural resources.
- ! To restore the integrity of affected lands in accordance with the policies of the U.S. Fish and Wildlife Service, the approved Fire Management Plan and Final Comprehensive Conservation Plan (CCP) and Environmental Assessment for the Bitter Lake National Wildlife Refuge and all relevant federal, state and local laws, policies and regulations.

Applicable Fish and Wildlife Burned Area Emergency Rehabilitation (BAER) Planning Requirements

Although there is a considerable volume of draft guidelines, regulation and policy related to burned area rehabilitation and funding currently in the development stage (**Draft 095 FW 3.1 Fire Management Handbook, Draft Departmental Manual 621 DM 1, Draft Interior Burned Area Emergency Rehabilitation Handbook, etc.**), none of this information had been formally approved or disseminated to the field at the time this plan was written. Accordingly, the Bureau of Indian Affairs Burned Area Emergency Rehabilitation Handbook was used as a reporting format guideline and for a reference to applicable treatment proposals. With respect to policy, 095 FW 3, Wildland Fire Management, was referenced and the following provisions of 621 FWS (3/1/95), Chapter 3.2 - 41 apply, especially with respect to the review and approval/funding of this text::

- ! Post-incident rehabilitation actions must be specified in a rehabilitation plan approved by the Regional Director (if less than \$250,000) or the Assistant Director, Refuges and Wildlife if more than the delegation of authority to the Regional Director. Accordingly, the program proposed in this plan must be reviewed and concurred with by the Regional Director, R2 and approved by the Assistant Director, Refuges and Wildlife, with copies forwarded to the Regional and Service Fire Management Coordinator.
- ! Emergency Fire Rehabilitation (EFR) actions will be funded through the Wildland Fire Appropriation, Operations Activity, Emergency Fire Rehabilitation Subactivity.
- ! The BAER plan must be submitted for approval within 30 days following fire CONTROL.

Applicable Bitter Lake Specific BAER Planning Direction/Mandates

- ! The Refuge Recreation Act (16 U.S.C. 460-1) identifies the refuge as being "suitable for incidental fish and wildlife orientated recreational development, the protection of natural resources and the conservation of endangered or threatened species."
- ! Primary refuge goals described in detail in the refuge Comprehensive Conservation Plan (Research Management Consultants, 1998) include, but are not limited to the following: 1). To restore, enhance and protect the natural diversity of the Bitter Lake NWR including threatened and endangered species, 2). To successfully maintain and restore habitat for native wildlife , 3). To monitor and study threatened, endangered and candidate species, their habitat

requirements...and human induced impacts to prevent further decline and eventual loss 4). To restore populations of aquatic species designated as endangered, threatened or of special concern to a sustainable level and 5). To develop and support ongoing resource management tactics that emphasize control of up to 5,000 acres annually of non-native plant species, including salt cedar.

- ! Approved fire management program objectives contained within the Fire Management Plan for the Pecos Fire Management Complex (Gavin, 1998) include, but are not limited to: 1). Mitigate (rehabilitate) human induced impacts to resources and/or natural processes and 2). Monitor and evaluate the effects of fire management on refuge ecosystems.

Fire Background

The Sandhill Fire was a human caused fire which started on March 5, 2000 at approximately 1100 hours (Appendix IV). The original fire start occurred within the rural subdivision of Bitter Lakes, nine miles east of Roswell, New Mexico, ignited by landowner attempting to weld range fence in the area. The point of origin was identified to be 1/4 of a mile west of the perimeter boundary line of Bitter Lake NWR, but well within the Mutual Threat Response Area defined by the cooperative agreement between the refuge and Chaves County Fire Services. Originally, it burned primarily within a moderately grazed alkali sacaton grass cover type, driven quickly to the east (towards the refuge) behind frontal passage winds that gusted in excess of 50 mph.

Chaves County Dispatch wasted no time in dispatching six local volunteer and federal fire departments to the fire. The original plan was to attack the flanks of the fast moving fire while providing structural protection to several rural residences that lie immediately adjacent to the refuge boundary. A total of five residences were protected. As the head of the fire moved towards Bitter Lakes Road, the decision was made to backfire the road, hoping to prevent further spotting across the blacktop. Bitter Lake engines initiated this task but could not complete the operation before some of the headfire slammed into the road, throwing flaming tumbleweeds and numerous spots into the wildlands which surround Bitter Lake on the refuge. Heavy T3 and T4 fire engines staffed by County and BLM personnel were able to suppress three spots in their infancy, before they could spread further into the refuge. A fourth spot, two acres when discovered, occurred furthest south on Bitter Lakes road and closest to refuge headquarters. This spot was attacked by two light, T6 engines (one from the FWS), without further water support. Given the limited water holding and delivery capacity of these engines, the spot continued to grow, doubling in size within minutes and spreading well into the Bitter Lake unit, more than several hundred yards off the Bitter Lakes Road. This area is littered with large sinkholes capable of swallowing both an engine and its crew without notice. Accordingly, refuge policy prohibits off road vehicle use in this portion of the refuge, including for purposes of fire suppression. At that point in time, the decision was made by the Bitter Lake FMO to allow the spot to spread into the refuge and slam into Bitter Lake. Immediately following this decision, the refuge fire staff put in place a pre-developed contingency plan to use indirect attack techniques, principally backfire, to finally suppress the fire and keep it contained within the refuge.

Approximately two miles of backfire was used to contain the fire in the Bitter Lake area. Almost 1.75 miles of backfire was set along the Northern flank, the flank that was most immediately threatened by fire being pushed by a southwest wind. In addition, a complex wetline/backfire operation was simultaneously initiated along the southern flank to protect the refuge headquarters and employee housing area from fire as it backed its way steadily to the south. In both instances, the wildfire and the backfire burned together cleanly. As these fire fronts met, the fire was **CONTAINED**; by Bitter Lakes Road on the west, by blackline to the North and South and by Bitter Lake on the east. Both blackline operations were highly successful and were credited with finally suppressing the fire. Without these backfire operations, it is estimated that the fire would have tripled in size, and could have eventually reached the salt cedar choked Pecos River, where the potential for further sustained fire spread would have been greatest.

It is important to note that the FMO and his Division Supervisor on the north flank of the fire carefully considered the existence of critical Threatened and Endangered species and its habitat along Lost River, Bitter Creek and in the Sago Springs area throughout the development of the plan to use backfire as a suppression technique. The backfiring operation on the north flank was delayed to the last possible moment in anticipation that the fire would bump into Bitter Lake and then extinguish itself, without burning Bitter Creek or Lost River. This did not occur and instead the fire made a very pronounced and strong run to the north. It is estimated that the northern flank backfire made contact with only the upper 1/3 of the Lost River habitat; the lower 2/3 was impacted by the wildfire. Although the possibility of burning out from the Lost River corridor itself, in advance of the approaching headfire, was an option initially considered by fire command, it was quickly dismissed after due consideration of fire behavior and firefighter safety. On the southern flank, where crews constructed blackline from a wetline, there is no question that the backfire strategy was instrumental in protecting a large amount of critical T&E habitat along the western shore line of the Bitter Creek water impoundment, immediately adjacent to the YCC complex road. In addition, the three person Bitter Lake fire crew and FMO worked until well after midnight that on March 6 to suppress all wildfire in close proximity to Sago Springs, in an effort to further protect remaining T&E habitat that had been yet unaffected by wildfire. This suppression work was done entirely by hand, and included the installation of considerable handline, since the area is inaccessible and off road vehicle traffic was prohibited. A qualified Wildland Fire Recourse Advisor from the refuge was on site throughout the entire incident and consulted with the FMO in relation to tactics and strategies on numerous occasions during the fire siege.

In summary, the fire burned between 3497 and 3550 feet in elevation. A total of 1470 acres were consumed, 420 acres on private and 1050 acres on the refuge. The fire had a 17.4 mile perimeter and burned nearly complete once it worked its way into the heavier, ungrazed fuels on the refuge. Vegetative communities impacted by the fire included alkali sacaton/salt grass and upland shrub (principally fourwing salt bush).

At its peak there were 70 personnel involved with the firefighting effort, not including law enforcement and other supporting functions. A total of 16 fire apparatus were committed, including 16, mostly "heavy" fire engines and three County water tenders. A total of 6 different agencies participated, including FWS Bitter Lakes, BLM Roswell District, Sierra Volunteer Fire department, Berrendo Volunteer Fire Department, East Grand Plains Volunteer Fire Department and Roswell Fire Department. Total suppression costs for the fire have been estimated at approximately 70 thousand dollars for the period from 1100 hours, 3/5/00 (start) to 2300 hours, 3/6/00 (CONTROL).

Immediately after fire control, the Bitter Lake Fire Management Officer consulted with the Refuge Biologist, New Mexico Game and Fish and the FWS NM-ES office to determine if a rehabilitation plan would be required. On 3/12, further consultation with these offices was initiated on site, at Lost River inside the fire perimeter. No attempt has been made to identify the rehabilitation needs on the private lands burned during the incident. The Bitter Lake FMO, in consultation with various biologists, the Assistant Refuge Manager and the refuge Fuels/Fire Effects Technician, tasked with evaluation of short- and long - term rehabilitation needs, developed this plan to address the following issues associated with the fire:

- ! Cultural and natural resource values impacted by the fire or fire suppression actions.
- ! Facilities or improvements impacted by the fire or the suppression of the fire.
- ! Rehabilitation requirements established by federal law, policies and relevant Department of the Interior resources management mandates.
- ! Rehabilitation requirements established by state laws, policies and regulations.

The ad hoc BAER team listed above conducted intensive field surveys immediately preceding the development of this plan in order to identify impacts and compile extensive recommendations for rehabilitation of the affected lands. On March 12, an emergency meeting of the ad hoc team was

conducted to tour the burned area and to develop specific mitigation proposals.

On March 8, 2000, the Bitter Lake FMO notified the FWS Regional Office and NIFC, in writing, of the intent by Bitter Lake Refuge to quickly develop and submit a comprehensive rehabilitation plan for funding (Appendix IV). The plan was submitted by the Refuge Manager on 3/24/00 and forwarded to R2, FWS this same day, within the policy guidelines related to the timely submission of the BAER plan (095 FW 3, Chapter 3.9B(3)(c)). The ad hoc rehabilitation team thoroughly discussed and agreed that all monitoring proposals must be tied to existing baseline data. Funding to continue the collection of baseline already underway would not be requested in the plan. However, in some cases the expansion of this work has been proposed via EFR dollars in order to accommodate all portions of the creek effected by fire.

On March 18, 2000, a formal fire critique of the Sandhill Fire was conducted. The findings of this critique are found in Appendix IV.

Issues Related to Plan Development and Implementation

The Lost River Corridor, which drains into Bitter Lake, is the most environmentally sensitive piece of real estate within the Bitter Lake Refuge, and perhaps one of the most sensitive in the entire Southwestern United States. A considerable amount of work had been done prior to the fire to collect baseline on the biota present in Lost River, Bitter Creek and Sago Springs. In addition, approximately 90% of the drainage has been cleared of very dense salt cedar in recent years. Accordingly, this plan must not only address the impacts of the fire on the fauna and flora of the area, it is also intended to maintain the natural system which for the most part, had been just recently restored due to years of work by the refuge staff.

Three different exigent rehabilitation (monitoring) treatments were initially identified by the team (during the March 12th meeting) as a means of determining impacts to T&E species present in Lost River/Bitter Creek and Dragonfly Springs: 1) macro invertebrate monitoring, 2) fisheries monitoring and 3) water quality monitoring intended to reflect effects to both macro invertebrates and fisheries. While the plan to follow has been developed in order to project three full years of funding via EFR dollars (see 095FW 3, 3.9B (3)(b)) **it is recognized that the monitoring proposals made within this text will be terminated following year one of funding, if a no-effect determination is concluded from data collected during year one post fire.** It is estimated that the majority of the effects to be documented will occur immediately following the first 2-3 major storm events over the burned area.

Concerns related to other resources are minimal due to the following factors:

- ! The area impacted by fire is relatively flat. The fire itself was of low to moderate burn intensity, typical of most wind driven range fires that occur in the absence of larger time lag fuels. Accordingly, no broadcast treatments are proposed for stabilizing soils away from immediate stream channels and wetlands (where micro climates may have promoted higher than normal fire intensities), or for mitigation of post fire flood events that would threaten life or property.
- ! With the exception of an increase in resprouting per unit area of salt cedar post fire (Gavin, 1987) there are no other general vegetative management concerns. According to Gavin (1979), the predominate species within the burned area, alkali sacaton, should make a full and vigorous recovery post fire given a normal New Mexico monsoon regime between now and the end of May. In the long run, the fire should promote species diversity and increase the palatability of forage and browse species, including four wing saltbush. There were no conifer or notable hardwood species present in any abundance within the fire perimeter.
- ! No cultural sites had been previously inventoried within the effected area. If such resources do occur, the use of Minimum Impact Suppression Tactics (MIST) throughout the Incident, by fire command, has greatly limited the scope and magnitude of mechanical effects on these resources, if not totally eliminated such effects. Wirth respect to the effects of the fire itself, it should be noted that this fire

was a wind blown event which resulted in short residence times, as witnessed by the mosaic burn patterns which occurred throughout an estimated 75% of the burned area. It is also important to note, that a good portion of the refuge land effected, perhaps as much as 40%, burned during a similar windblown wildfire in 1997, although this fire was documented not to have impacted Bitter Creek or Lost River.

- ! The area impacted by the Sandhill Fire is a research natural area. Grazing of domestic livestock and general public access to this area is prohibited. Accordingly, no facilities, visual resources or recreational values were impacted.

Other concerns, related to T& E species, the reduction of nesting habitat, increased competition of non-native plants and effects on water quality within sensitive riparian habitats have been discussed in detail within individual subject matters assessments (Appendix I).

Constraints on Plan Implementation

- ! All equipment and materials purchased during individual project implementation will be purchased by the FWS and provided with a FWS property tag before it can be loaned to a cooperator or contractor. Property transfers to cooperators will occur only for the duration of on-going monitoring approved in this plan and must be supported by appropriate documentation.
- ! The findings of all contractual monitoring or related investigations must be properly documented to the U.S. Fish and Wildlife Service. This data will not be published without formal approval of the agency.
- ! An interim progress review and accomplishment report will be completed by the Refuge Manager NLT one year from approval of this plan and every year thereafter for the duration of the three year program. Failure to conduct this review will result in the cancellation of years 2-3 funding, if proposed in the original plan. Documentation submitted to the Regional Director in support of the review must include a "determination of effect", either positive or negative, relative to all ongoing monitoring funded via EFR. Positive or no effect determinations relative to any sampling or monitoring protocols will force termination of years 2-3 of a specific project, if proposed.

References

Thomas M. Gavin. 1979. The Effects of Fire on the Production, Utilization and Nutritional Value of Alkali Sacaton in Brewster County, Texas. Masters Thesis, Sul Ross State University, Alpine Texas. 324 pp.

Thomas M. Gavin. 1987. Fire Management Plan for Joshua Tree National Park. National Park Service, Department of the Interior. 294 pp.

Thomas M. Gavin. 1998. Fire Management Plan for the Pecos Fire Management Complex. Fish and Wildlife Service, Department of the Interior. 212 pp.

Research Management Consultants, 1998. Final Comprehensive Conservation Plan and Environmental Assessment. Fish and Wildlife, R2., Department of the Interior. 64 pp.

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**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

PART A FIRE LOCATION AND BACKGROUND INFORMATION

Fire Name	Sandhill Fire	Date Controlled	March 6, 2000
Fire Number	P - 3683	Total Acres Burned	1,470
Agency Unit	FWS/Bitter Lake NWR	Acres / Jurisdiction	
Region	Southwest	NPS	
State(s)	New Mexico	BIA	
County(s)	Chaves	FWS	1,050
Ignition Date/Manner	March 5, 2000/accidental human caused	State	
Zone	Lincoln	Private	420
Date Contained	March 5, 2000	Other	

PART B NATURE OF PLAN

I. Type of Plan (check one box below):

<input type="checkbox"/>	Short-term Rehabilitation (complete Parts A, B, C, and H only)
<input type="checkbox"/>	Long-term Rehabilitation (complete all parts)
<input checked="" type="checkbox"/>	Both Long and Short Term Rehabilitation (completed all parts)

II. Type of Action (check one box below):

<input checked="" type="checkbox"/>	Initial submission
<input type="checkbox"/>	Updating or revising the initial submission
<input type="checkbox"/>	Supplying information for accomplishment to date on work underway
<input type="checkbox"/>	Different phase of project plan
<input type="checkbox"/>	Final report (to comply with the closure of the EFR account)

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

PART C REHABILITATION ASSESSMENT OBJECTIVES/PARTICIPANTS

I. Sandhill Fire Burned Area Emergency Rehabilitation Incident Objectives

- ! Recommend post-fire rehabilitation prescriptions and funding sources which prevent irreversible loss of natural and cultural resources.
- ! As practical and necessary, restore/maintain natural conditions to areas disturbed by fire effects or suppression actions.
- ! Conduct immediate post-burn reconnaissance for fire and fire suppression related impacts to T&E.
- ! Provide long-term monitoring recommendations intended to ensure the success of rehabilitation efforts.
- ! Develop water course stabilization strategies when necessary to protect downstream values and watershed integrity.

II. BAER Team Members

SPECIALTY/PROFESSION	NAME/AGENCY	ASSESSMENT INCLUDED (Yes or No)
Team Leader (FMO)	Tom Gavin (USFWS)	N/A
Fuels Specialist (Vegetation) Fire Effects Monitor Fire Effects Monitor	Jim Sullivan (USFWS) Kimberlee Kuhur (NPS) Kevin E. Rehman (NPS)	YES
Contaminants Specialist	Joel Lusk (FWS)	YES
Wildlife Biologist(s)	Gordon Warrick (FWS) Brian Lang (NMGF)	YES YES

III. Resource Advisors: (Note: Resource Advisors are individuals who assisted the BAER Team with the preparation of this plan. See Part G of this plan for a full list of agencies and individuals who were consulted or otherwise contributed to the development of this plan.)

NAME	AFFILIATION, SPECIALTY, or PROFESSION
Environmental Contaminants Specialist	Joel Lusk (FWS, NMES)
Bob Larson	NMGF, Biologist
Steven Platania	UNM, Wildlife Scientist
Chris Hoagstrom	FWS, NMFRS, Fishery Biologist
David Propst	UNM, Fisheries Biologist
Robert Dudley	UNM, Fisheries Biologist

Jim Brooks	FWS, NMFRS, Project Leader
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**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

PART D SUMMARY OF APPROVAL AUTHORITIES (By Activities/Cost)

ACTIVITIES REQUIRING SUPERINTENDENT APPROVAL	COST
Fire Activity Suppression Damage - FSAD (charged to Fire Suppression)	
NO SUPPRESSION RELATED REHABILITATION PROPOSED	F
SUBTOTAL	\$0
BAER ACTIVITIES REQUIRING REGIONAL REVIEW/CONCURRENCE, APPROVAL BY ASST. DIRECTOR, REFUGES AND WILDLIFE:	
EFR Rehabilitation request (charged to EFR)	
CONTROL THE REINVASION OF SALT CEDAR WITHIN THE LOST RIVER AND BITTER CREEK CORRIDORS (SEE 095 FW 3, 3.9 B (2) (c) and (e))	\$18,315
REPLACE PRE-EXISTING FENCE REQUIRED FOR RESOURCE PROTECTION OF CRITICAL T&E HABITAT (SEE 095 FW 3, 3.9 B (2) (e))	\$6,033
CONDUCT MACRO INVERTEBRATE AND AQUATIC HABITAT MONITORING IN THE LOST RIVER, BITTER CREEK AND SAGO/DAGONFLY SPRINGS (SEE 095 FW 3, 3.9 B (2) (f))	\$143,830
CONDUCT POST FIRE MONITORING OF ENDANGERED FISH POPULATIONS WITHIN EFFECTED HABITAT (SEE 095 FW 3, 3.9 B (2) (f))	\$176,870
CONDUCT POST FIRE WATER QUALITY ANALYSIS TO DETERMINE EFFECTS ON T&E SPECIES AND HABITAT (SEE 095 FW 3, 3.9 B (2) (f))	\$268,033
INSTALL SILT FENCING TO PREVENT SEDIMENT, PARTIALLY BURNED DEBRIS AND ASH FROM ENTERING SEVERELY BURNED PORTIONS OF THE LOST RIVER/BITTER CREEK CORRIDORS (SEE 095 FW3,3.9B(2)(a))	
SUBTOTAL	\$
TOTAL REHABILITATION COST (FSAD AND EFR)	\$

COST BREAKDOWN BY FISCAL YEAR: 2000 - \$270,733

*** 2001 - \$153,464**

*** 2002 - \$153,464**

TOTAL \$ 577,661

* Funding in FY's 2001 and 2002 Contingent on a "negative effect" determination following FY 2000 data collection.

DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT

PART E SUMMARY OF ACTIVITIES

The SUMMARY OF ACTIVITIES table identifies **trackable** rehabilitation costs charged or proposed for funding from fire suppression rehabilitation, emergency fire rehabilitation, agency operations, and other for three years post fire. Only trackable expenditures are displayed in the total cost column. They are coded with the appropriate cost authority, as either Fire Suppression Rehabilitation (**F**), Emergency Fire Rehabilitation (**EFR**), Agency Operations (**OP**) or Other (**O**)

TREATMENT SPECIFICATION	UNIT	UNIT COST	# OF UNITS	COST BY FUND SOURCE			IMPLEMENTATION METHOD	SPECIFICATION TOTAL
				FIRE	EFR	OP		
N-2 Weed Control; Control the reinvasion of salt cedar within the Lost River and Bitter Creek Corridors	SITES	\$6,105.00	3.0		\$18,315		P	\$18,315
N-1 Protection of Threatened and Endangered Species; Replace pre-existing fence required for resource protection of critical T&E Habitat	FENCE	\$6,033.00	1.0		\$6,033		C	\$6,033
N-1 Protection of Threatened and Endangered Species; Conduct macro invertebrate and Aquatic Habitat Monitoring in the Lost River, Bitter Creek and Sago/Dragonfly Springs	SAMPLES	see spec breakdown by year	684		\$143,830		C	\$143,830
N-1 Protection of Threatened and Endangered Species; conduct post fire monitoring of endangered fish populations within effected habitat	SITES	see spec breakdown by year	10		\$176,870		C	\$176,870
N-1 Protection of Threatened and Endangered Species; Conduct post fire water quality analysis to determine fire effects on T&E species and habitat	SAMPLES	see spec breakdown by year	2100		\$268,033		P	\$268,033
N-1 Protection of Threatened and Endangered Species and W - 5 Stream Course Stabilization; ;install silt fencing to prevent sediment, partially burned debris and ash from entering severely burned portions of the Lost River and Bitter Creek Corridors	MILES		0.50					
TOTAL COST					\$577,661			\$577,661
COST: F=Suppression; EFR=Long-term Rehab.; OP=Base Funding. METHOD: FC=Crews Assigned to Fire; C=Contract; EFC=Emergency Fire Contract; P=Agency Personnel								

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

PART F - SPECIFICATION 1.

SPECIFICATION TITLE:	CONTROL THE REINVASION OF SALT CEDAR WITHIN THE LOST RIVER AND BITTER CREEK CORRIDORS	AGENCY:	FWS, Bitter Lake NWR
PART E LINE ITEM:	N - 2 Weed Control	FISCAL YEAR(S) (list each year):	2000,2001,2002

I. WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:	
<p>A. General Description: Prior to the Sandhill Fire, the Lost River and Bitter Creek Corridors had been mechanically cleared of saltcedar. Sprouting plants were being treated with a selective application of herbicides. Prescribed fire was not being used as a control technique in these areas due to the presence of T&E species and since it has been documented that on a stems per acre basis, the number of saltcedar sprouts actually increases following the application of fire alone, without subsequent herbicidal treatment. The Sandhill Fire will unquestionably promote sprouting of new salt cedar plants and through the temporary elimination of native competition, will expose previously uninvaded sites to invasion by this species. This project proposal is intended to fund the increased maintenance workload associated with keeping these sensitive habitats salt cedar free post fire. Theoretically, the maintenance workload should gradually decrease over the three year period; so should costs. Nevertheless, a constant cost for maintenance has been requested below as a worst case scenario approach.</p> <p>B. Location/(Suitable) Sites: Lost River and Bitter Creek Corridors, Sago Springs and the eastern shoreline of Bitter Lake effected by the Sandhill Fire</p> <p>C. Design/Construction Specifications:</p> <ol style="list-style-type: none"> 1. Conduct a 100% visual reconnaissance of the effected area in late spring of each year. Map and flag any new areas of salt cedar infestation noted at that time. 2. During the late summer, early fall, use Rodeo as a foliar spray to chemically treat new sprouts and as a stump application (recut and treat) to target resprouts which may occur in association with larger trees previously treated.. Keep accurate notation of treatment areas and subsequent mortality success. <p>D. Purpose of Treatment Specification: (1) To maintain a naturally functioning ecosystem , salt cedar free, within the sensitive areas effected by the Sandhill Fire (2) To protect T&E species habitat in these riparian areas by maintaining the water levels and flow characteristics of the Lost River and Bitter Creek drainage.</p>	

II. LABOR, MATERIALS AND OTHER COST:

? PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST/ITEM
GS-5 @ 10.93 / hour X .35 benefits X 320 hours/yr (project administration, fieldwork, consultation, documentation/mapping and reporting) X 3 years	\$14,165
TOTAL PERSONNEL SERVICE COST	\$14,165
? EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST/ITEM
Chainsaw maintenance for three years	\$500
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$500
? MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST/ITEM
Rodeo \$150/gallon X 18 gallons	\$2700
Gasoline/saw fuel @ \$150/year x 3	\$450
Misc.	\$500
TOTAL MATERIALS AND SUPPLY COST	\$3,650
? TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST/ITEM
TOTAL TRAVEL COST	\$0

? CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST/ITEM
TOTAL CONTRACT COST	\$0

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNITS COST	# OF UNITS	COST	FUNDING SOURCE/ ACTIVITY TYPE	METHOD
FY 1	SITE	\$2,035.00	3.0	\$6,105	EFR (ER)	P
FY 2	SITE	\$2,035.00	3.0	\$6,105		
FY 3	SITE	\$2,035.00	3.0	\$6,105		
TOTAL	SITE			\$18,315	EFR	P

FUNDING SOURCES:

F = Fire Suppression
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other

METHODS:

P = Agency Personnel Services
C = Contract (long-term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

ACTIVITY TYPE:

ER = Emergency Restoration
R = Restoration
B = Burned Area Emergency Rehab
FSAD = Fire Supp. Damage

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	M
3. Estimate supported by cost guides from independent sources or other federal agencies	
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, M = Materials/Supplies, T = Travel C = Contract F = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Vegetation Management Assessment, Appendix I for more details
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**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

PART F - SPECIFICATION 2.

SPECIFICATION TITLE:	REPLACE PRE-EXISTING FENCE REQUIRED FOR RESOURCE PROTECTION OF CRITICAL T&E HABITAT	AGENCY:	FWS, Bitter Lake NWR
PART E LINE ITEM:	N1 Protection of Threatened and Endangered Species	FISCAL YEAR(S) (list each year):	2000

I. WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

- A. General Description:** Approximately 1.0 miles of boundary fence along Bitter Lakes Road was burned by the Sandhill Fire. In New Mexico, the "fence out" rule applies. Domestic livestock seasonally graze west of this fence line and accordingly, it is a Service responsibility to prevent the livestock from entering the refuge through the existing damaged fence. Once into the refuge, trespass cattle will naturally be drawn to the sensitive riparian habitat along Lost River and Bitter Creek. At present, the fence along Bitter Lakes Road remains standing although many of the wooden fence posts are badly burned. In addition, there is no doubt that the tensile strength of the dated wire along the fence line has been structurally weakened and will begin to fail in subsequent years. Total replacement of the damaged section is therefore proposed.
- B. Location/(Suitable) Sites:** (Bitter Lakes Road, see Treatment Map). Fence is to be established on original fence line locations (no cultural survey required).
- C. Design/Construction Specifications:**
1. New fence materials shall be utilized.
 2. Construct four wire fence along refuge boundary adjacent to Bitter Lakes Road consisting of three strands of 12 ½ gauge twisted barbed wire and a bottom strand of 12 ½ gauge twisted smooth wire, unless high stock use and pressure on the private side necessitates barbed throughout. Five and ½ foot steel T posts shall be driven 1 ½ feet into the ground and spaced at 16.5 feet. Interior fences shall be constructed of 3 wire with the bottom wire being smooth.
 3. Wood or steel brace posts (stress panels) as recommended by the Refuge Manager shall be placed at the corners or at a maximum of 1/4 mile spacing or as necessary to compensate for topographical undulations. Brace posts are to be secured using 12 ½ gauge smooth steel wire with a minimum breaking strength of 950 lbs. Force.
 4. Additional specifications regarding fence replacement will be provided upon initiation of project.
 5. Remove all burned materials from area, including old wire, and store at Refuge bone yard.
- D. Purpose of Treatment Specification:** To prevent trespass livestock from entering refuge and further impacting the Bitter Creek, Lost River Corridors.

II. LABOR, MATERIALS AND OTHER COST:

? PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST/ITEM
FWS Support and Contract Administration Costs GS-11 @ 225/day x one-day/week x 4 weeks x 1 FY	\$900
TOTAL PERSONNEL SERVICE COST	\$900
? EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST/ITEM
	N/A
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$0

? MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST/ITEM
12 ½ Gauge domestic galvanized twisted two point barbed wire @ \$35 roll x 16 rolls	\$560
5 ½ ft. Steel Painted T posts @ 2.59 ea. X 320	\$828
12 ½ gauge domestic galvanized twisted smooth wire @ \$38/roll x 4	\$152
8 ft brace posts (wood or steel) @ \$10/ ea. X 5	\$50
Wire T post clips @ \$.05 ea. X 1280	\$64
Fence Staples @ \$30/ib. X 3 lbs	\$90
48 inch wire twist stays @ .59 ea. X 660	\$389
TOTAL MATERIALS AND SUPPLY COST	\$2,133
? TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST/ITEM
	N/A
TOTAL TRAVEL COST	\$0
? CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST/ITEM
\$3000/MILE	\$3,000
TOTAL CONTRACT COST	\$3,000

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNITS COST	# OF UNITS	COST	FUNDING SOURCE/TYPE	METHOD
FY 1	FENCE	\$6,033.00	1.0	\$6,033	EFR (B)	C
FY 2						
FY 3						
TOTAL	FENCE	\$6,033.00	1.0	\$6,033	EFR (B)	C

FUNDING SOURCES:

F = Fire Suppression
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other

METHODS:

P = Agency Personnel Services
C = Contract (long-term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

ACTIVITY TYPE:

ER = Emergency Restoration
R = Restoration
B = Burned Area Emergency Rehab
FSAD = Fire Supp. Damage

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P/M
3. Estimate supported by cost guides from independent sources or other federal agencies	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, M = Materials/Supplies, T = Travel C = Contract F = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Treatment Map, Appendix III for location of treatment
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**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

PART F - SPECIFICATION 3.

SPECIFICATION TITLE:	CONDUCT MACRO INVERTEBRATE AND AQUATIC HABITAT MONITORING IN THE LOST RIVER, BITTER CREEK AND SAGO/DAGONFLY SPRINGS	AGENCY:	FWS, Bitter Lake NWR
PART E LINE ITEM:	N - 1 Protection of Threatened and Endangered Species	FISCAL YEAR(S) (list each year):	2000, 2001, 2002

I. WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
<p>A. General Description: Collect, process and report on three years (if necessary) of post fire MACRO INVERTEBRATE and aquatic habitat monitoring data from Lost River, Bitter Creek and Dragonfly Springs. This is an expansion of NM Game and Fish studies already underway and the program is intended to tier off the existing database specifically for the purpose of documenting fire effects, not to duplicate existing studies or to fund ongoing data collection efforts.</p> <p>B. Location/(Suitable) Sites: Areas effected by the Sandhill Fire within Dragonfly Springs and the Lost River and Bitter lake Corridors, including the outlet of Bitter Creek into Bitter Lake (along immediate shoreline and wetland).</p> <p>C. Design/Construction Specifications: Permanent inventory stations in Bitter Creek and Sago Springs ("control") will be resampled according to protocols established for macro invertebrates during pre-fire conditions by NMGF. Benthic (substrate) grabs and or tile samples will be collected from six stations in both Bitter Creek and Sago Springs. A total of 25 samples (19 from Bitter Creek and 6 from Sago Spring) will be collected in the study area. Macro invertebrate microhabitats will be quantified by recording substrate type, water depth, velocity and physicochemical data (temp., DO., TDS, salinity, conductivity, pH, CO2) at each sample site. Measures of hydrologic macrohabitat conditions of Bitter Creek will include hourly measurements of water temperature at seven permanent stations. Bitter Creek physicochemical conditions (see above) and stream discharge will be measured at the "Flume site" hourly and at 15 minute intervals, respectively, by unattended data loggers. Thermal conditions in sago Springs complex will be recorded hourly at two permanent stations during the study period. Macro invertebrate collections will be stored and enumerated by taxa to relate species diversity and relative abundance to pre- and post-fire sampling periods.</p> <p>D. Purpose of Treatment Specification: To determine and document the effects of fire on the endangered macro invertebrates within Lost River and Bitter Creek, Bitter Lake NWR</p>

II. LABOR, MATERIALS AND OTHER COST:

? PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST/ITEM
Field Collection, \$235/day X 3 days per month X 36 months	\$25,300
Lab Collection Management, 228 samples/yr X 3 yrs. @ \$65/sample	\$58,500
Data Analysis and Report, 40 days @ 235/day x 3 reports	\$28,200
TOTAL PERSONNEL SERVICE COST	\$112,000
? EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST/ITEM
Hydrolab Minisonde (purchased year 1)	\$10,000
Temperature Loggers and Software (purchased year 1)	\$1,500
Hydrolab Annual Maintenance, \$250/year X 3 years (purchased year 1)	\$750
CO2 Sensor (purchased year 1)	\$500
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$12,750
? MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST/ITEM
Lab Misc., \$1000/yr for 3 years	\$3,000
Field Misc, \$1000/yr for 3 years	\$3,000
TOTAL MATERIALS AND SUPPLY COST	\$6,000

? TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST/ITEM
Per Diem, 2 nights/mo. X 36 mos. @ \$65/night	\$4,680
Field (round trip), 600 miles @ \$0.25/mile x 36mos.	\$5,400
Symposia (project presentation) \$1,500/symposia X 2	\$3,000
TOTAL TRAVEL COST	\$13,080
? CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST/ITEM
SEE PERSONAL SERVICES ABOVE (DONE VIA COOPERATIVE AGREEMENT WITH NMFG)	N/A
TOTAL CONTRACT COST	\$0

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNITS COST	# OF UNITS	COST	FUNDING SOURCE/TYPE	METHOD
FY 1	SAMPLES	\$247.51	228.0	\$56,434	EFR(ER)	C
FY 2	SAMPLES	\$191.65	228.0	\$43,698	EFR	
FY 3	SAMPLES	\$191.65	228.0	\$43,698	EFR	
TOTAL	SAMPLES		684.0	\$143,830	EFR	C

FUNDING SOURCES:

F = Fire Suppression
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other

METHODS:

P = Agency Personnel Services
C = Contract (long-term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

ACTIVITY TYPE:

ER = Emergency Restoration
R = Restoration
B = Burned Area Emergency Rehab
FSAD = Fire Supp. Damage

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	C/M/T
3. Estimate supported by cost guides from independent sources or other federal agencies	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, M = Materials/Supplies, T = Travel C = Contract F = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: See Macro invertebrates Assessment and Appendix IV for more details regarding sampling technique and purpose

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

PART F - SPECIFICATION 4.

SPECIFICATION TITLE:	CONDUCT POST FIRE MONITORING OF ENDANGERED FISH POPULATIONS WITHIN EFFECTED HABITAT	AGENCY:	FWS, Bitter Lake NWR
PART E LINE ITEM:	N - 1 Protection of Threatened and Endangered Species	FISCAL YEAR(S) (list each year):	2000, 2001, 2002

I. WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: The 5 March 2000 wildfire at Bitter Lake National Wildlife Refuge resulted in the complete burn of vegetation along Bitter Creek Pond, Bitter Creek, and its headwaters, Dragonfly Springs. This narrow spring-fed stream is occupied by at least six species of fish including the state and federally listed Pecos gambusia (*Gambusia nobilis*), Pecos pupfish (*Cyprinodon pecosensis*) whose federal listing was precluded by a conservation agreement, and state listed greenthroat darter (*Etheostoma lepidum*). The federally endangered Pecos gambusia is one of the most abundant species in Bitter Creek.

At least three discrete data sets exist that document the ichthyofaunal composition of the fish community of Bitter Creek and associated waters. Collections from the early 1970s provide early reference baseline information on the distribution and abundance of fish species throughout Bitter Lake National Wildlife Refuge. Systematic collection of long-term monitoring data for fishes and water quality in the Refuge was begun in the mid-1980s by U.S. Fish and Wildlife Service (New Mexico Fisheries Resources Office) and is ongoing. This data set includes detailed information on the longitudinal distribution of fishes and water quality in both Bitter Creek (from Bitter Creek Pond to Dragonfly Springs) and Sago Springs. Most recently, monthly sampling (n=14 pre-fire) of fish and water quality in Bitter Creek and Bitter Creek Pond (and Sago Springs and Sago Springs Pond) began in January 1999 as part of a Section 6 study (through New Mexico Department of Game and Fish) of the life-history of Pecos pupfish. These complimentary studies comprise an extensive and extremely valuable data set that collectively provide the background information necessary to assess any changes in the fish community of Bitter Creek that may occur as a result of the 2000 Sandhill Fire.

It is proposed to merge the aforementioned datasets and **initiate** new extensive fish and water quality monitoring activities in Bitter Creek. Sampling in Bitter Creek will be conducted to provide information on longitudinal distribution and abundances of fishes throughout the Bitter Creek portion Sandhill Burn Area. Fish will be sampled, with minnow-traps, at approximately 10 sites between Bitter Creek Pond and Dragonfly Springs. Monitoring will occur at least monthly with additional sampling being performed immediately after local rain events. Concurrent information will be acquired on water quality. In addition to monitoring fish distribution and abundance, we plan to mark a selected portion of the population to monitor fish movement and determine population densities in Bitter Creek. It is important to note that this is an expansion of ongoing studies, not an attempt to duplicate or fund ongoing data collections.

B. Location/(Suitable) Sites: Areas effected by the Sandhill Fire within Dragonfly Springs and the Lost River and Bitter Lake Corridors, including the outlet of Bitter Creek into Bitter Lake (along immediate shoreline and wetland).

C. Design/Construction Specifications:

See Appendix IV, Supporting Documentation for a copy of monitoring protocols developed by NM Game and Fish.

D. Purpose of Treatment Specification: To determine and document the effects of fire on endangered fisheries in Lost River and Bitter Creek, Bitter Lake NWR.

II. LABOR, MATERIALS AND OTHER COST:

? PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST/ITEM
Field Collection, \$250/day X 6 person days per trip X 50 trips (over three years)	\$64,800
Data Entry @ \$250/day, X 50 days (over three years)	\$12,500
Data Analysis and Report, 180 days @ 250/day (over three years)	\$45,000
TOTAL PERSONNEL SERVICE COST	\$123,100

? EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST/ITEM
Injector and Elastomer Tags - 1st year costs	\$2,000
Additional Injectors - 1st year costs	\$500
Elastomer Color Tags (four colors)- 1st year costs	\$1,500
Elastomer Color Tag Refills (four colors) - 1st year costs	\$3,000
Flourescent Reader - 1st year costs	\$500
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$7,500
? MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST/ITEM
Field Gear - 1st year costs (includes handheld YSI 55 Water Quality Meter)	\$2,500
Office Supplies - 1st year costs	\$1,000
Lab Supplies - 1st year costs	\$2,500
TOTAL MATERIALS AND SUPPLY COST	\$6,000
? TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST/ITEM
Milage @ 600 (RT) X \$0.30/mile X 50 trips over three years	\$9,000
Meetings and data presentations over three years	\$1,500
Per Diem 50 days X 3 people @ 45/day (over 3 years)	\$6,700
TOTAL TRAVEL COST	\$17,200
? CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST/ITEM
Contract Administration of above catagories over three years (.15)	\$23,070
TOTAL CONTRACT COST	\$23,070

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNITS COST	# OF UNITS	COST	FUNDING SOURCE/TYPE	METHOD
FY 1	SITES	\$6,795.60	10.0	\$67,956	EFR (ER)	C/P
FY 2	SITES	\$5,445.00	10.0	\$54,457		
FY 3	SITES	\$5,445.00	10.0	\$54,457		
TOTAL	SITES		30.0	\$176,870	EFR (ER)	C/P

FUNDING SOURCES:

F = Fire Suppression
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other

METHODS:

P = Agency Personnel Services
C = Contract (long-term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

ACTIVITY TYPE:

ER = Emergency Restoration
R = Restoration
B = Burned Area Emergency Rehab
FSAD = Fire Supp. Damage

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P/M/T/C
3. Estimate supported by cost guides from independent sources or other federal agencies	
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, M = Materials/Supplies, T = Travel C = Contract F = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report:
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DEPARTMENT OF THE INTERIOR

BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT

PART F - SPECIFICATION 5.

SPECIFICATION TITLE:	CONDUCT POST FIRE WATER QUALITY ANALYSIS TO DETERMINE FIRE EFFECTS ON T&E SPECIES AND HABITAT	AGENCY:	FWS, Bitter Lake NWR
PART E LINE ITEM:	N - 1 Protection of Threatened and Endangered Species	FISCAL YEAR(S) (list each year):	2000, 2001, 2002

I. WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
<p>A. General Description: Collection and shipment of samples, maintenance of water quality measuring devices, measurements, water quality testing and the documentation of results.</p> <p>B. Location/(Suitable) Sites: Six Bitter Creek and 6 Sago Springs (unburned control) sites, or a total of twelve sites. Areas effected by the Sandhill Fire within Dragonfly Springs, Lost River and Bitter Lake Corridors, including the outlet of Bitter Creek into Bitter Lake (along immediate shoreline and wetland).</p> <p>C. Design/Construction Specifications:</p> <p>See Appendix IV, Supporting Documentation for a copy of the detailed cost breakdown</p> <p>D. Purpose of Treatment Specification: To determine and document the effects of fire on water quality</p>

II. LABOR, MATERIALS AND OTHER COST:

? PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST/ITEM
GS 9 Service Employee @ 34575 X .35 benefits X .20 support X 3 years	\$168,033
TOTAL PERSONNEL SERVICE COST	\$0
? EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST/ITEM
Water Quality Measuring Devices	\$65,000
Containers, preservatives for Lab Analysis	\$5,000
Containers, equipment supplies for Easy Analysis	\$15,000
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$85,000
? MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST/ITEM
Misc. materials and supplies covered by support costs associated with personal services	N/A
TOTAL MATERIALS AND SUPPLY COST	\$0
? TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST/ITEM
Travel to/from Bitter Lake NWR for sampling purposes @ 5000/yr x 3 yrs	\$15,000
TOTAL TRAVEL COST	\$15,000
? CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST/ITEM
	N/A
TOTAL CONTRACT COST	\$0

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNITS COST	# OF UNITS	COST	FUNDING SOURCE/TYPE	METHOD
FY 1	SAMPLE	\$208.58	700.0	\$146,011	EFR (ER)	P
FY 2	SAMPLE	\$87.16	700.0	\$61,011	EFR	
FY 3	SAMPLE	\$87.16	700.0	\$61,011	EFR	

TOTAL	SAMPLE		2,100.0	\$268,033	EFR	P
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FUNDING SOURCES:

F = Fire Suppression
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other

METHODS:

P = Agency Personnel Services
C = Contract (long-term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

ACTIVITY TYPE:

ER = Emergency Restoration
R = Restoration
B = Burned Area Emergency Rehab
FSAD = Fire Supp. Damage

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P
3. Estimate supported by cost guides from independent sources or other federal agencies	T/M
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, M = Materials/Supplies, T = Travel C = Contract F = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

List Relevant Documentation and Cross-Reference Location within BAER Report: Sources of Cost Estimates: 1). Patuxent Analytical Control Facility on Lab Costs - nutrients, trace elements, aromatic and aliphatic scans. 2). Hydro Corporation for water quality monitoring probes 3). Hach products for analysis of basic water quality measurements. See Appendix IV, Supporting Documentation.

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

PART F - SPECIFICATION 6.

SPECIFICATION TITLE:	INSTALL SILT FENCING TO PREVENT SEDIMENT, PARTIALLY BURNED DEBRIS AND ASH FROM ENTERING SEVERELY BURNED PORTIONS OF THE LOST RIVER AND BITTER CREEK CORRIDORS	AGENCY:	FWS, Bitter Lake NWR
PART E LINE ITEM:	N - 1 Protection of Threatened and Endangered Species; W-5 Stream Stabilization	FISCAL YEAR(S) (list each year):	2000

I. WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:
<p>A. General Description: Install approximately 0.5 miles of silt fence in critically burned area along the Bitter Creek and Lost River Corridors. Exact locations to be specified by Regional Hydrologist on 4/8/00.</p> <p>B. Location/(Suitable) Sites: Six Bitter Creek and 6 Sago Springs (unburned control) sites, or a total of twelve sites. Areas effected by the Sandhill Fire within Dragonfly Springs, Lost River and Bitter Lake Corridors, including the outlet of Bitter Creek into Bitter Lake (along immediate shoreline and wetland).</p> <p>C. Design/Construction Specifications:</p> <p>See Appendix IV, Supporting Documentation for a copy of the detailed cost breakdown</p> <p>D. Purpose of Treatment Specification: To determine and document the effects of fire on water quality</p>

II. LABOR, MATERIALS AND OTHER COST:

? PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST/ITEM
GS 9 Service Employee @ 34575 X .35 benefits X .20 support X 3 years	\$168,033
TOTAL PERSONNEL SERVICE COST	\$0
? EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST/ITEM
Water Quality Measuring Devices	\$65,000
Containers, preservatives for Lab Analysis	\$5,000
Containers, equipment supplies for Easy Analysis	\$15,000
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$85,000
? MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST/ITEM
Misc. materials and supplies covered by support costs associated with personal services	N/A
TOTAL MATERIALS AND SUPPLY COST	\$0
? TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST/ITEM
Travel to/from Bitter Lake NWR for sampling purposes @ 5000/yr x 3 yrs	\$15,000
TOTAL TRAVEL COST	\$15,000
? CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST/ITEM
	N/A
TOTAL CONTRACT COST	\$0

SPECIFICATION COST SUMMARY

FISCAL YEAR	UNIT	UNITS COST	# OF UNITS	COST	FUNDING SOURCE/TYPE	METHOD
FY 1	SAMPLE	\$208.58	700.0	\$146,011	EFR (ER)	P
FY 2	SAMPLE	\$87.16	700.0	\$61,011	EFR	
FY 3	SAMPLE	\$87.16	700.0	\$61,011	EFR	
TOTAL	SAMPLE		2,100.0	\$268,033	EFR	P

FUNDING SOURCES:

F = Fire Suppression
EFR = Emergency Fire Rehabilitation
OP = Agency Operating Fund
O = Other

METHODS:

P = Agency Personnel Services
C = Contract (long-term)
EFC = Emergency Fire Contract
FC = Crew Labor Assigned to Fire

ACTIVITY TYPE:

ER = Emergency Restoration
R = Restoration
B = Burned Area Emergency Rehab
FSAD = Fire Supp. Damage

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P
3. Estimate supported by cost guides from independent sources or other federal agencies	T/M
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **M** = Materials/Supplies, **T** = Travel **C** = Contract **F** = Suppression

III. RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

<p>List Relevant Documentation and Cross-Reference Location within BAER Report: Sources of Cost Estimates: 1). Patuxent Analytical Control Facility on Lab Costs - nutrients, trace elements, aromatic and aliphatic scans. 2). Hydro Corporation for water quality monitoring probes 3). Hach products for analysis of basic water quality measurements. See Appendix IV, Supporting Documentation.</p>
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BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT

PART G CONSULTATIONS

U.S. Fish and Wildlife Service

John Morton, Regional Prescribed Fire Specialist, Albuquerque, New Mexico
Bill Radke, Refuge Manager, San Bernardino NWR, Douglas, Arizona
Jeff Casey, Prescribed Fire Specialist, Bitter Lake NWR
John Magera, Asst. Refuge Manager, Bitter Lake NWR

Berrendo Volunteer Fire Department

Tom Mealand, Fire Chief, BVDF, Roswell, New Mexico

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

PART H FWS - Bitter Lake National Wildlife Refuge

REVIEW AND APPROVAL

I. Suppression Related Rehabilitation Approval (check one box below):

- ☐ **G Approved**
☐ **G Approved with Revision**
☐ **G Disapproved**

Explanation for revision or disapproval:

N/A No Suppression Related Rehabilitation Proposed

FWS, Project Leader

Date

II. Emergency Fire Rehabilitation (EFR) Review (check one box below):

- ☐ **G Concur**
☐ **G Concur w/ Recommended Revision**
☐ **G Do not Concur**

Explanation for revision or non-concurrence:

Regional Director, R2 FWS

Date

III. Emergency Fire Rehabilitation (EFR) Approval (check one box below):

- ☐ **G Approved**
☐ **G Approved with Revision**
☐ **G Disapproved**

Explanation for revision or non-approval:

Asst. Director, Refuges and Wildlife, FWS

Date

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

APPENDIX I: BAER TEAM RESOURCE ASSESSMENTS

- ! Macro invertebrate Assessment
- ! Water Quality Assessment
- ! Vegetation Assessment
- ! Wildlife/Species of Concern Assessment

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

Sandhill Fire

MACRO INVERTEBRATE ASSESSMENT

I. ISSUES

- Bitter Creek provides critical habitat for many species of sensitive, threatened and endangered macro invertebrates, as well as other aquatic taxa (Table 1). Potential impacts to all of these taxa exist from post-fire physical effects (ash deposition, stream bank erosion, sloughing of highly friable gypsiferous soils, sedimentation) to Bitter Creek.
- Post-fire impacts to Bitter Creek hydrologic conditions anticipated by modification of thermal regime, pH, alkalinity, and salinity.
- Low stream discharge raises concern for resident time of ash loads in the aquatic environment of the Sandhill Fire area. Increased organic (ash) input into Bitter Creek may stimulate proliferation of bacterial detritivores; thus, increasing biological oxygen demand and reducing dissolved oxygen in the altered thermal regime of Bitter Creek.
- Physiochemical changes may exert complex, multi-trophic-level effects on food webs of Bitter Creek and Bitter Lake.

II. OBSERVATIONS

A. Background

The Permian Basin of the southwestern United States contains one of the largest and thickest accumulations of carbonate deposits (e.g., evaporite rocks: gypsum, salts, potash) in the world. Extensive evaporite deposits, commonly called the "Gypsum Plain", exist along the western flank of the Delaware basin in southeastern New Mexico within the Artesia Group and San Andres Formation in the Vaughn-Roswell area. The Delaware basin contains abundant sinkholes, caves, closed depressions, collapse sinks, and underground drainage; and constitutes the largest expanse of karst topography in the nation. Bitter Lake National Wildlife Refuge (BLNWR) lies in a unique hydrogeologic setting within the Delaware basin in southeastern New Mexico, and represents a critical area of groundwater discharge in the Roswell Artesian Basin. In addition, the BLNWR harbors unique and diverse assemblages of flora and fauna, including several state endemic taxa, or species that occur on the refuge as geographically disjunct populations at their global limits of geographic occurrence in North America.

Bitter Creek is a narrow (0.5-1.25 m), sinuous stream with its' headwaters occurring as numerous artesian spring upwellings, locally known as "Dragonfly Springs". Another hydrologically significant artesian discharge exists approximately ¼ mile downstream at the confluence of Bitter Creek with Lost River, where vertical facies form a cave-like depression in compacted yet highly friable gypsum soils. No other spring head upwellings have been noted in the reach downstream of Lost River, however aquifer discharge likely occurs throughout the ca. 1.8 km (1.1 mile) reach of Bitter Creek. Substrates of Bitter Creek consist of deep (0.25-0.50 m) aqueous organic silts and clays. Water depths of lotic reaches of Bitter Creek range from 0.05 to 0.45 m, and are deepest (1.5 m) at Lost River pool.

Sago Springs wetland complex is ca. 0.3 km (1000 l.f.) long. Upper reaches of the wetland consist of a series of artesian spring head pools in gypsum sinkholes that are inter-connected by a gallery of hypogean stream courses, which coalesce to form a narrow (<1.0 m), short (150 m) spring brook. A shallow water marsh exists at the terminus of Sago Springs run, and is contiguous with Bitter Lake. Substrates of gypsum sinkholes are indurate and highly friable, whereas white shifting sand is characteristic of

downstream lotic reaches of the wetland complex. Water depths are greatest in upstream sinkholes and in the downstream marsh (≈0.10-1.25 m), and shallowest (≈0.05-0.25 m) in run habitat.

Calcareous soils in the study area belong to the Holloman-Gypsum land complex of moderate permeability and rapid runoff (USDA 1982). The riparian vegetation of both wetland systems consists of low-profile xerophilic shrubs (four-winged saltbush [*Atriplex canescens*], snakeweed [*Gutierrezia* sp.], and gyp bush [*Tiquilia hispidissima*]) on escarpments admixed with grasses (*Sporobolus* spp., *Bouteloua* spp.) and woody hydrophytes (sea lavender [*Limonium libatum*], *Baccharis* sp., iodine bush [*Allenrolfea occidentalis*]) in hydrophyllic soils adjacent to the spring run. Marsh emergents include *Phragmites* sp., *Dystichlis* sp., *Eleocharis* spp., *Juncus* spp., *Scirpus* spp., and *Carex* spp.

Environmental Baseline. Macro invertebrate populations and macro- and micro-habitat conditions of Bitter Creek and Sago Springs wetland complex were quantified monthly from June 1995 to June 1998. Monitoring periods are categorized by 12-month intervals: Year I (June 1995-May 1996), Year II (June 1996-May 1997), and Year III (June 1997-June 1998).

Six permanent sampling stations were established along Bitter Creek. Macro invertebrate were sampled by three quantitative benthic grabs (**substrate samples**) per sample station. A total of 19 benthic samples were collected from Bitter Creek per year 1995-1998. Twelve sampling stations established in Sago Springs complex consisted of eight, 4" x 4" clay tile substrates. All benthos recovered from benthic and tile samples were preserved in 70% ethanol in the field. Table 2 presents density of benthos as a standard measure of the total number of individuals by species/m² for Year I samples.

Microhabitat parameters recorded at all sample sites were: (1) water depth and velocity; (2) substrate type (tile, aqueous organic, organic consolidated, gypsum indurate, gypsum unindurate); and (3) standard physicochemical water parameters (temperature, pH, specific conductance, salinity, TDS, dissolved oxygen).

Stream temperatures were measured hourly from September 1996 to July 1998 at four and two stations in Bitter Creek and Sago Springs wetland complex, respectively. Moreover, physicochemical water quality parameters listed above were measured hourly at the flume in Bitter Creek for a 24-28 day period each seasonal quarter (Spring [May], Summer [August], Fall [November], Winter [February]) from Fall 1995 to Summer 1998.

Discharge at the Bitter Creek flume has been measured every 15 minutes from February 1995 to present.

B. Reconnaissance Methodology

Immediately post fire, three site visits were made prior to the preparation of this assessment to make observations and collect some tentative data along Bitter Creek and Lost River. The data collected during these visits was done in accordance with Specification 3, Part F of the Burned Area Emergency Rehabilitation Plan and Accomplishment Report.

C. Findings

Post-fire hydrologic conditions within the Sandhill Fire burn area of Bitter Creek show a 36-hour delayed response by an increase in stream temperature with a concomitant decrease in dissolved oxygen (Figure 1). Fluvial (stream) transport of aeolian ash formed black surface mats of ash throughout the entire reach of Bitter Creek. Light penetration of the Bitter Creek water column appeared reduced. Benthic sampling revealed deposition of ash to stream sediments. Exposed soils along the streambanks lined with charred (black) vegetation likely serve as a heat sink which radiates heat to Bitter Creek during late afternoon to early evening hours. The post-fire thermograph of Bitter Creek (see figures 1 and 2) supports this effect by a significant increase in night time stream temperatures. Elevated stream temperatures coupled with decreased insolation of Bitter Creek from floating ash mats likely account for the decrease in primary production of autotrophs (algae, phytoplankton) observed by post-fire depression in percent saturation of

dissolved oxygen in Bitter Creek (Figure 2). At Day 2 post-burn, other physicochemical hydrologic parameters (i.e., salinity, pH, TDS, specific conductance) of Bitter Creek showed no appreciable change relative to 3-year (1995-1998) pre-burn baseline data. Change in some of these parameters is anticipated during precipitation events coincident with ongoing deposition and downstream transport of ash. Continuous unattended water quality data logging (hourly) is ongoing in the middle reach of Bitter Creek (flume) and at a thermal spring head in the upper reach of Bitter Creek. Water temperature is likewise measured hourly at seven stations throughout the ca. 1.5 mile reach of Bitter Creek.

Complete burn of vegetation along Bitter Creek minimizes ability of riparian zone to control deposition of wind blown debris into the stream channel. Post-fire accumulations of tumbleweed have lined the channel of Bitter Creek. This raises concern for reduction in stream discharge in a stream of low base flows and small annual discharge, which in turn increases retention time of ash loads *in situ*, and likely decreases availability of dissolved oxygen due to increased biological oxygen demand by detritivores (bacteria). This cascading scenario of the abiotic (physical) and biotic aquatic environment, already supported by post-burn hydrologic data of Bitter Creek, raises concern for multi-trophic-level effects on food webs, short-term survival of the unique sensitive vertebrate and invertebrate fauna macro invertebrate, and long-term habitat recovery of the Sandhill Burn Area.

Pre-fire baseline data documented thermal stability of spring heads in the upper reaches of Bitter Creek. These thermally stable habitats provide winter refugia for over-wintering fish and ameliorate warming of Bitter Creek during hot summer months. Post-fire observations documented dense aggregations of fish species residing in spring head pools of Bitter Creek at a time in late winter (February-March) when fish typically abandon these thermal refugia by dispersing throughout Bitter Creek.

Stream banks along Bitter Creek show early sign of sloughing and are highly susceptible to erosion from wind and runoff due to dry top soil from ongoing regional drought conditions, which were exacerbated by the loss of riparian vegetation and weakening of plant root masses during the Sandhill Fire. The shoreline of Bitter Lake showed deposition of wind blown and hydrologic transport of ash from up gradient burn areas.

Physical attributes of unattended data loggers (flume and Hydrolab) showed evidence of fire intensity and duration along Bitter Creek. The wooden frame and protective PVC cable pipe of the Bitter Creek flume were charred, but physical integrity was intact. The PVC stand pipe for the Hydrolab datasonde showed evidence of intense heat, but the sonde was positioned low enough in the water to avoid adverse heat exposure. Pre- and post-fire data recorded on these sensors provide opportunity for the following observations.

III. RECOMMENDATIONS

A. Management

None

B. Monitoring

General. Post-fire assessment of all taxa listed in Table 1, including aquatic insect populations in Bitter Creek (not listed) and aquatic and terrestrial habitats in the Sandhill Fire burn area, should be monitored according to monthly and seasonal protocols established and defined by pre-fire environmental baseline research. The post-fire monitoring period is proposed for three years, if necessary, unless a no-effect determination is made following one year of data collection. Such a study design allows for pre- and post-fire comparisons of data; thus facilitating object interpretation of research results to prescribe ecologically sound management actions on sensitive wildlife populations and habitats in the Sandhill Fire burn area.

Bitter Creek Hydrology. Post-fire stream discharge continues to be measured every 15 minutes in Bitter Creek. Measures of physicochemical water quality parameters will continue hourly at two stations in Bitter Creek: in the rheocrene near the flume (middle reach) and in a thermal spring head (upper reach). Thermal monitoring continues hourly at seven permanent stations throughout the Bitter Creek study area and at two stations in Sago Spring wetland complex (post-fire, "experimental" control).

Macro invertebrate Specific. The sampling protocol for Bitter Creek and Sago Springs macro invertebrate (crustaceans, mollusks, and insects) will follow the same protocol established by pre-fire investigations. Benthic (substrate) grabs and/or tile sample will be collected from six permanent stations each in Bitter Creek and the Sago Springs complex (experimental control): a total of 25 samples (19 from Bitter Creek and six from Sago Springs) will be collected in the study area. Substrate type, water depth, stream velocity, and hydrologic parameters will be recorded at each sample site. See Treatment Specification, Part F., Burned Area Emergency Rehabilitation Plan and Accomplishment Report.

IV. CONSULTATIONS

V. REFERENCES

Brian Lang, Endangered Species Biologist (NMGF)

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Table 1. Conservation status of aquatic and terrestrial biota that occur in Sandhill Burn Area (Bitter Creek and Sago Springs), Bitter Lake National Wildlife Refuge, Chaves County, New Mexico.

State Federal Common Name	Scientific Name Comments	Status	Status
Pecos Puzzle Sunflower	<i>Helianthus paradoxus</i> endemic	T	Tstate
Noel's amphipod	<i>Gammarus desperatus</i> endemic	E	SCstate
Pecos assiminea snail	<i>Assiminea pecos</i>	E	C--
Roswell spring snail	<i>Pyrgulopsis roswellensis</i> state endemic	E	C
Koster's spring snail	<i>Tryonia kosteri</i> endemic	T	Cstate
Pecos pupfish	<i>Cyprinodon pecosensis</i> Pecos River endemic	T	PE
Pecos gambusia	<i>Gambusia nobilis</i> River endemic	E	EPecos
Greenthroat darter	<i>Etheostoma lepidum</i>	T	----
Interior Least Tern	<i>Sterna antillarum</i>	E	T-

Index: E = Endangered, T = Threatened, PE = Proposed Endangered under conservation agreement, C = Candidate, and SC = Species of Concern

Table 2. Preliminary results of Year I (June 1995-May 1996) monthly macro invertebrate sampling at Bitter Lake National Wildlife Refuge, Chaves County, New Mexico.

	BITTER CREEK	SAGO
SPRINGS		

Faunal Assemblage present biomass greatest)	All 3 prosobranch snails present (<i>Tryonia kosteri</i> biomass greatest)	All 3 prosobranch snails (<i>Pyrgulopsis roswellensis</i>)
	2 amphipod species present (<i>Hyaella azteca</i> , <i>Gammarus desperatus</i>)	2 amphipod species present (<i>Hyaella azteca</i> , <i>Gammarus desperatus</i>)
	Tubificidae, Hirudinea, ostracods, peaclams, physid snails, aquatic insect larvae (Trichoptera, Ephemeroptera, Diptera, Odonata)	Hirudinea, Planaria (<i>Dugesia</i> sp.), physid snails, aquatic insect larvae (Odonata)
Relative Abundance	<i>Gammarus desperatus</i> = 64-8768/m ² <i>Assimineia pecos</i> = 64/m ² <i>Tryonia kosteri</i> = 704-89,472/m ² <i>Pyrgulopsis roswellensis</i> = 64-512/m ²	<i>Gammarus desperatus</i> = 26-575/m ² <i>Assimineia pecos</i> = 64/m ² <i>Tryonia kosteri</i> = 75- 512/m ² <i>Pyrgulopsis roswellensis</i> = 1125-27,924/m ²

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

Sandhill Fire

WATER QUALITY ASSESSMENT

I. ISSUES

- Water Chemistry in Bitter Creek and Lost River have been altered, or may be altered in an adverse way, as a post fire effect which is detrimental to Threatened and Endangered species
- Increased post fire erosion within the effected area could result in long term changes to stream physical structure (course, flow, etc.)

II. OBSERVATIONS

A. Background

The effects of fire on the aquatic systems within the Bitter Creek and Lost River Drainage may be direct and immediate or indirect and sustained over time. Ultimately, these effects are to be constrained by fire size and intensity, post fire weather, and the physical, chemical, and biological properties of the site (i.e., the Bitter Creek wetland complex and water quality). The text to follow summarizes in brief some of the major impacts of water quality changes due to fire, as well as the means by which to monitor these changes in conjunction with floral and faunal studies that monitor biological/ecological impacts.

Impacts to water quality. Fire acts as a mineralizing agent, releasing nutrients from soils and from ash to surface water by overland flow and by wind deposition. The ionic composition of the water may change resulting from increased: pH, nitrate, total nitrogen, phosphate, total phosphorus, total dissolved solids, alkalinity, hardness, calcium, magnesium, potassium, silica, sodium, sulfate, trace elements (aluminum, iron, lead, zinc, selenium, etc.) as well as combustion byproducts and ash. Sudden changes in these parameters can either be lethal to aquatic fauna (e.g., elevated pH>9, combustion byproducts) or indirectly detrimental to fauna by shifts in water chemistry (low oxygen content, changes in faunal composition, habitat characteristics, chronic toxicity of combustion byproducts or excessive ion stresses on faunal physiology).

Overland flow and erosion contributes sediment and turbidity. Episodic or intense storm events produce overland flow and increase erosion. Channel scouring, mass erosion, and sediment delivery to the stream can have detrimental effects to aquatic fauna. Sediment texture, concentration of total suspended solids, turbidity, and sediment yield are likely to change over time. The invertebrate and fish community as well as the characteristics of their habitat are influenced by stream bed instability associated with erosion as well as decreased light due to turbidity.

Shade reduction caused by loss of vegetative cover causes increased water temperature. Elevated temperature can be directly lethal to fauna, reduce the total available dissolved oxygen available, or change the water chemistry. Predicting the biological consequences of temperature changes is difficult.

B. Reconnaissance Methodology

Following the fire, a brief site visit was made to Bitter Creek in order to make some observations and and conduct some tentative measurements.

C. Findings

Due to existing monitoring efforts, there are a few water quality data available after the fire. Stream side vegetation has been denuded. Where measured, water temperatures and pH have increased, while dissolved oxygen has decreased. Ash and soil have blown into or fallen into the stream.

III. RECOMMENDATIONS

A. Management

Conduct immediate and routine surveillance of the effected areas to document visual fish kill.

B. Monitoring

Monitor hourly the basic water quality parameters (temperature, dissolved oxygen, pH, specific conductivity) at several locations based on habitat (riffle, pool, run, spring head) along the Bitter Creek and similar habitat locations at the reference site (Sago Springs wetland complex) for up to three years, and even more, if a "no effect" determination cannot be made following analyzation of year on data.

Monitor in conjunction with storm events or daily the instantaneous discharge, average discharge, turbidity, and total suspended solids content in water at several locations based on habitat (riffle, pool, run, spring head) along the Bitter Creek and similar habitat locations at the reference site (Sago Springs wetland complex) for two years reducing to monthly monitoring for five years. Monitor in conjunction with storm events or monthly nutrients in water and sediments (nitrate, phosphate, total nitrogen, ammonia, total phosphorus), major ions (calcium, potassium, sodium, silica, chloride, and sulfate), at several locations based on habitat (riffle, pool, run, spring head) along the Bitter Creek and similar habitat locations at the reference site (Sago Springs wetland complex) for two years reducing to semiannual monitoring for five years.

(Alternatively, monitor in conjunction with storm events or monthly those nutrients and ions THAT ARE EASY AND INEXPENSIVE to analyze in water including some nutrients (nitrate, ammonia, total nitrogen, ortho-phosphate, total phosphorus) and some major ions (alkalinity, hardness, chlorides, and sulfates) at several locations based on habitat (riffle, pool, run, spring head) along the Bitter Creek and similar habitat locations at the reference site (Sago Springs wetland complex) for two years reducing to semiannual monitoring for five years.)

Monitor in conjunction with storm events or semiannually trace elements in water and sediments (aluminum, barium, boron, cadmium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, zinc), at several locations based on habitat (riffle, pool, run, spring head) along the Bitter Creek and similar habitat locations at the reference site (Sago Springs wetland complex) for two years reducing to yearly for five years.

Monitor in conjunction with storm events or semiannually aliphatic hydrocarbons (waxes, oils, terpenes, etc.), aromatic hydrocarbons (anthracene, naphthalene, and other polycyclic hydrocarbons and combustion byproducts), texture and organic content of water and sediments at several locations based on habitat (riffle, pool, run, spring head) along the Bitter Creek and similar habitat locations at the reference site (Sago Springs wetland complex) for two years reducing to yearly for five years.

IV. CONSULTATIONS

V. REFERENCES

U.S. Department of Agriculture, Natural Resource Conservation Service. 1996. National Handbook of Water Quality Monitoring. 13 Chapters.

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

Sandhill Fire

VEGETATION RESOURCE ASSESSMENT

I. ISSUES

- Documentation of burn severity is an important factor related to post fire effects and recovery of native vegetation.
- Appropriate treatment recommendations to ensure vegetative recovery and to prevent the post fire encroachment of exotic vegetation.

II. OBSERVATIONS

This report will briefly discuss the impacts of the Sandhill Fire which occurred Sunday March 5, 2000. Both short term (suppression-related), and long term rehabilitation recommendations will be referred to in this report.

A. Background

Fire History. The Sandhill Fire encompassed 1,470 acres; 420 acres on private land and 1050 on the Bitter Lake National Wildlife Refuge. The Sandhill fire was a human ignition which occurred on private land on March 5. With the passage of a front through the Roswell area, the fire spread onto refuge land. Fuel models involved were FM1 dominated by grama and threeawn grasses, FM3 dominated by alkali sacaton with Phragmites dominating along creek and spring areas, and FM5 which best represents the **salt cedar** areas which carried the fire. Due to the nature of the topography and inherent dangers due to the high number of sinkholes it was determined that a backfire operation would be most effective in containing the fire on the Refuge. Within the Refuge area T&E species were of a concern in Bitter Creek and several springs along the northeast and east flanks of the burn.

Vegetation Composition. Two vegetation transects were installed along the west flank of the fire prior to the event. Composition of the plots sampled were: Plot 1 - Cryptogamic soil 17%, Gutierrezia sarothrae 1%, Muhlenbergia torreyi 24%, Sporobolus airoides 38%, Substrate 22%, and Vigiera stenolaba. Plot 2 - Gutierrezia sarothrae 3%, Sporobolus airoides 83%, and Substrate 17%.

Other vegetation affected by the fire, but not sampled were salt cedar, Bouteloua spp, buffalo grass, and Phragmites. Coverage has not been estimated for these species.

B. Reconnaissance Methodology

Data obtained through plot sampling was based on the Western Region Fire Monitoring Handbook protocols (Gavin, Sydoriak and Others, 1990). Two thirty meter transects were established representing grass dominated cover types. From the data collected brush densities, herbaceous densities, and grass coverage were determined. Post burn severity observations were collected from both transects.

Areas where T&E species were a concern were also sampled to determine burn severity. In both areas no plots had been established. Observations were ocular and utilized FMH terminology to best characterize the severity of the sites impacted.

During the duration of the Sandhill fire, monitoring based on FMH standards did not occur, nor were weather observations obtained at the site. Fire behavior is based on anecdotal information from personnel at the fire. Weather observations were obtained from the local BLM RAWS weather station.

C. Findings

Fire Behavior. Primary spread of the fire was a wind driven head fire. In areas where hand ignition occurred, fire spread was mainly a head fire as well. Estimated flame lengths were 1-30'. No rates of spread were estimated. With the passage of a front, winds were often erratic and gusty with a predominantly westerly component. At dusk, winds began to decrease, humidity increased and temperatures dropped; active spread of the fire decreased becoming mainly flanking in character.



Figure 1. Running headfire / 1-30' flame lengths



Figure 2. Backfire operation.

Weather. Based on BLM weather station observations temperatures on the day of the fire ranged from 37-76 degrees fahrenheit. The lowest temperatures were at night and the highest during the day. Humidity ranged from 5-39%, with lowest at 1300 and the highest in the evening hours. Wind speeds were not available, but based on ocular observations they were erratic and gusty with speeds of 15-30 mph. Winds from afternoon came from the southwest, west, to northwest at nightfall due to the frontal passage. High temps, low RH's, and erratic winds were consistent with the rapid spread of the fire during the afternoon and late afternoon hours.

Burn Severity. Based on postfire observations burn severities varied from unburned to heavily burned. Minimal damage to soil horizons were observed. Though the predominant spread of the fire was a head fire, continuity of fuels, winds, topography, and roads served to leave behind a mosaic pattern of burned and unburned vegetation. Estimated total area affected by the passage of fire is 60 - 70% of the 1050 acres of the refuge portion of the burn.

In areas where salt cedar was the primary carrier of fire little to no damage occurred to the vegetation. Often in the burn areas sites dominated by shrub and salt cedar species appeared to serve as a fuel break. Areas dominated by grass types and impacted by the fire received the higher ratings for burn severity.



Figure 3. Mosaic Pattern / Bitter Creek Area



Figure 4. Plot #1 post burn / scorched to lightly burned.

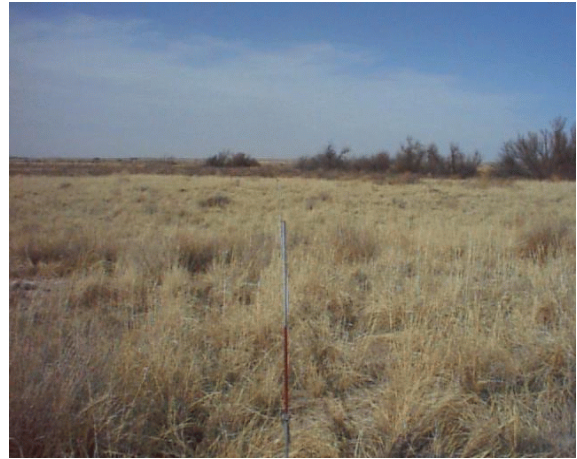


Figure 5. Plot #1 preburn

Burn severity rating for Plot 1 is 4.3 for the organic substrate or scorched, and 3.0 for the vegetation being lightly burned. For plot 2 the severity rating was 4.0 for the substrate, and 3.0 for the vegetation. In both sites the passage of fire had minimal impact as the following photos reveals.

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Figure 6. Postburn Plot #2
substrate are fairly untouched.



Figure 7. Preburn Plot #2

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The entire portion of Bitter Creek which lies within the burned area was affected by the fire. Along Bitter Creek ocular observations reveal a burn rating of 1 or heavily burned along the east bank and two or moderately burned along the west bank.



Figure 9. Spring on northern flank.



Figure 10. Spring on North Flank of Fire

Sp in rings the vicinity of Bitter Creek ranged in severity from unburned to moderately burned, though lightly burned would best describe the overall impact.

III. RECOMMENDATIONS

A. Management

1. Initiate an aggressive monitoring and the Bitter Creek and the reintroduction or these sensitive areas
2. Keep trespass sensitive riparian River via fence repair

B. Monitoring

1. Reread fire monitoring



Figure 8. Postburn Bitter Creek Area

saltcedar surveillance eradication program along Lost River Corridors to prevent resprouting of plants within post fire.

livestock from entering the areas of Bitter Creek and Lost along Bitter Lakes Road.

plots one year post burn

2. Establish photo-monitoring plots in Bitter Creek and Lost River to visually monitor vegetative recovery in these sensitive areas

IV. CONSULTATIONS

V. REFERENCES

Gavin, Thoms M., Sydoriak, Charisse and Others. 1990. Western Region Fire Monitoring Handbook, National Park Service. 211 pp.

Jim Sullivan, Fuels Technician, Bitter Lake NWR

505-622-6755, X 22

**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

Sandhill Fire

WILDLIFE/SPECIES OF CONCERN ASSESSMENT

I. ISSUES

- One federally listed Endangered species, one Proposed for Endangered and one federally Threatened species occur within the fire perimeter.
- Three federal Candidate species occur within the fire perimeter.
- One federally listed Endangered species seasonally occurs (nests) downstream from the fire perimeter.
- Additionally, five New Mexico Threatened or Endangered species occur within the fire perimeter.
- Potential affects to these species from the fire, suppression actions and potential post-fire effects to down-stream species.
- Potential affects to these species from rehabilitation actions.

II. OBSERVATIONS

The purpose of this Burn Area Emergency Rehabilitation (BAER) Wildlife Assessment is to document the effects of the fire, suppression activities, proposed rehabilitation work, and other potential post-fire effects to all Proposed, Threatened and Endangered animals and their habitats, which may occur within or downstream from the fire area. Bitter Creek, which almost all of occurs within the fire boundary, is the primary area of concern, since all but one of the addressed species are permanent residents therein, or immediately adjacent to. Bitter Lake is an enclosed natural playa which Bitter Creek flows into and which very seldom fills, and experiences outflow.

A. Background

See Final Comprehensive Conservation Plan and Environmental Assessment (1998) for Bitter Lake NWR for detailed discussions wildlife presence and use within the refuge and specifically, Bitter Creek.

B. Reconnaissance Methodology and Results

Information used in this assessment is based on review of relevant literature, consultation with Fish and Wildlife Service (FWS) and New Mexico Department of Game and Fish (NMG&F) Biologists, wildlife sightings and habitat inventory data, and reconnaissance of the Sandhill Fire area. Reconnaissance included FWS Biologist Gordon Warrick on numerous occasions; NMG&F Invertebrate Biologist Brian Lang, and FWS Contaminants Specialist Joel Lusk on March 8; Brian Lang again on March 16; FWS Fishery Biologist Chris Hoagstom, FWS Fishery Biologist James Brooks, NMG&F Fish Biologist David Propst, NMG&F Fish Biologist Bob Larsen, Fish Biologist Steve Plantania, and Brian Lang on March 12; and two assistants of Steve Plantania on March 15 and 16. Extensive fish surveys, snail and amphipod surveys and water quality monitoring had been conducted prior to the fire. A Hydrolab water quality monitoring instrument was in place in Bitter Creek before, during and after the fire, collecting various water quality parameters every hour. Lusk and Lang conducted limited sampling during their March 8 visit to Bitter Creek. Warrick has been

monitoring various water quality parameters at multiple sites on the creek since the fire. Plantania's assistants expanded their long-term fish monitoring project to include several additional minnow traps which were checked on March 16. Pre,during, and post fire data will be discussed in more detail in relation to the effected species below.

Biological Assessment for Federally Listed and Candidate Species:

PECOS GAMBUSIA: Pecos gambusia (*Gambusia nobilis*) is a federally Endangered fish which inhabits isolated thermally stable spring-head habitat in the Pecos River valley. On Bitter Lake National Wildlife Refuge, it occurs naturally in Bitter Creek and Sago Springs, and probably once occurred in pure form in the springs on the west side of the artificial impoundments. It has been introduced to Lake St. Francis, Inkpot, Little Inkpot and a few additional sinkholes on the refuge. Stocking attempts in sinkholes have generally been unsuccessful on the refuge. Bitter Creek (1 mile from Dragonfly Springs to Bitter Lake) probably harbors the single greatest naturally occurring population on the refuge. With saltcedar removal and increased rainfall, the upper portion of Bitter Creek (above Dragonfly Springs) has remained watered and provides marginal, limited habitat for Pecos gambusia. This area is upstream from the burn. In the lower portion of Bitter Creek Pecos gambusia give way to western mosquitofish, with which they have been known to hybridize. Pecos gambusia may be restricted to waters with a hardness of less than 5,100 mg/l and a conductivity of less than 28,000 micromhos. They have a fairly narrow temperature tolerance; generally between 21 and 30 C. A salinity level of 30 ppt may be the upper limit for the species. Periodic surveys (with minnow traps) and observations at the springheads have documented the relative abundance of the species in Bitter Creek, but population size is unknown. In an ongoing University of New Mexico Pecos pupfish life history research project, Pecos gambusia and other fish have been trapped on a monthly basis at two sites in Bitter Creek, providing information on relative abundance and seasonal population fluctuations/ activity patterns. However, those data are not immediately available.

DIRECT EFFECTS: There were probably little if any direct effects to Pecos gambusia. The fire burned briefly and intensely at any given point along Bitter Creek, and probably did not expose the water to high temperatures long enough to sharply raise water temperatures. A Hydrolab that was in place at the time of the fire collecting temperatures on the hour, did indicate a slight (2° C) rise in water temperature concurrent with the fire event. This was partly due to numerous saltcedar branches and logs that were seen, partially burned, that had fallen into the water. Declining oxygen as temperatures rose may have been a greater risk to the survival of gambusia. One dead female gambusia was found at the Bitter Creek Weir on March 8. Cause of death was not apparent. A 2.75 hour walk of Bitter Creek to Dragonfly Springs on March 15, resulted in 5 dead fish being seen (two Pecos gambusia). It is unlikely that any of these deaths resulted directly from the fire. Healthy-appearing gambusia and other fish were observed at the Bitter Creek weir, Lost River Pool and Dragonfly Springs on March 8. Several dozen healthy gambusia (and other fish) were trapped on March 15.

INDIRECT EFFECTS: Several indirect fire effects may be detrimental to Pecos gambusia. Currently there is a tremendous load of ash and other organic debris in the creek. Strong winds have periodically resulted in additional amounts of ash being blown into the creek. The bacterial and microbial breakdown of this and other organic debris could result in dangerously low dissolved oxygen levels in the water. Hydrolab monitoring at the weir has documented over-night oxygen levels decreasing since the fire to levels dangerous to fish survival. Peak temperatures have increased sharply since the fire, because of the removal of shading by last year's Phragmites plants, and by increased solar radiation absorption by ash in the water and on adjacent stream banks. Dissolved oxygen decreases with increased water temperature, thus compounding concerns for oxygen stress and mortality. Pecos gambusia in a minnow trap placed near Dragonfly Springs on March 15 and checked on the 16th, experienced heavy mortality, probably due to low dissolved oxygen. The number of Russian thistles (tumbleweeds) in the creek have dramatically increased since the fire due to the removal of the nearly complete barrier afforded by the tall Phragmites

plants in and adjacent to the creek. Russian thistle has further added to the organic matter in the creek and reduced flow rates and velocities which may contribute to decreased oxygen levels in the water. The tumbleweeds may, additionally, impede water flow during heavy precipitation events, creating mini-dams behind saltcedar branches, contributing to severe bank erosion. However, they may provide some shading to minimize temperature increases. Precipitation could result in large amounts of salt, sediment and additional ash entering the creek. Salt was accumulated on the soil surface adjacent to the creek in a readily apparent crust, due to saline water being evaporated from the soil surface and a complete lack of winter precipitation. Salinities could reach lethal levels for Pecos gambusia. Sediment from runoff and bank sluffing could interfere with the survival of food organisms (i.e. invertebrate larvae) upon which Pecos gambusia feed, and upon fish spawning and egg development; much of the creek bank is extremely friable, and could result in large amounts of substrate entering some parts of the creek if heavy rains occur. Water chemistries will likely change from the mineralized soils and ash, thus increasing pH, nitrates, total nitrogen, phosphate, alkalinity, and other chemical parameters. The effect on the various trophic levels over time could be widespread and dramatic, effecting the survival of Pecos gambusia and multiple interrelated species. Springhead habitats, although low in dissolved oxygen, are nonetheless environmentally stable, and presently harbor large numbers of gambusia. Springheads may act as refugia for some number of gambusia, should conditions in the stream deteriorate. Recolonization would likely eventually occur should significant mortality occur in the creek, once near pre-fire conditions have returned.

PECOS PUPFISH: Pecos pupfish (*Cyprinodon pecosensis*) is federally Proposed for Endangered. It occurs in a variety of habitats in the Pecos River drainage of New Mexico and West Texas, from saline springs and gypsum sinkholes to desert streams with highly fluctuating conditions. They are the most widespread and abundant species of fish on the refuge, occupying Salt Creek, Bitter Creek, Bitter Lake (ephemerally), Sago Springs, all refuge impoundments, Pecos River oxbows, numerous sinkholes, and (less commonly) the Pecos River. In Bitter Creek, Pecos pupfish are most abundant in the lower portion, where salinities and water temperatures are higher, and velocities lower. They have been recorded in waters with salinities as high as 89.1 ppt. As many as 196 were caught in one minnow trap during a 24-hour period. They probably also benefit from reduced competition in this portion of Bitter Creek.

DIRECT EFFECTS: As with Pecos gambusia above, direct fire effects on Pecos pupfish were probably insignificant. Water temperatures during passage of the flame front rose only by about 2° C. Pupfish can withstand much more extreme environmental conditions than gambusia, and almost certainly experienced no direct fire mortality. A single dead pupfish was found when walking the entire length of Bitter Creek on March 15, but its death may have been unrelated to the fire.

INDIRECT EFFECTS: Indirect fire effects are complicated and unpredictable, and may extend over a long period of time. All of the concerns enumerated for Pecos gambusia apply to the Pecos pupfish, but for some factors to a lesser degree. Pupfish can probably withstand greater siltation, water temperatures and lower dissolved oxygen levels than gambusia. The greatest risk to pupfish as a result of the fire may be the uncertain effect on the various trophic levels that ultimately provide the pupfish's food resources. Bitter Lake, in its presently high level, and with relatively low salinities, provides habitat for pupfish; it may also provide a refugia for pupfish presently in the lower part of Bitter Creek, should conditions in the creek become unfavorable. Should fire-related mortality of pupfish occur, their numbers are expected to eventually return to pre-fire levels.

GREENTHROAT DARTER: Greenthroat darter (*Ethiostoma lepidum*) is a New Mexico Threatened species. It occurs in two disjunct areas of the Southwest: the Edwards Plateau of south-central Texas and the lower Pecos River drainage. It is not widespread on the refuge, occurring mostly in a few springhead and springrun habitats, and may still occur to a lesser degree in gravelly shoreline areas of some impoundments. It has been captured in low numbers (relative to other fishes) in the upper portion of Bitter Creek. It lacks an air bladder, and is thus an essentially a benthic feeder. It

prefers temperatures between 14 and 24° C. It feeds mostly on crustaceans and invertebrates, but also consumes some plants.

DIRECT EFFECTS: The direct effects of the fire on greenthroat darter was almost certainly minimal. As mentioned above, water temperatures rose only slightly during fire passage. Temperatures at the bottom of the water column, where the darter resides, were probably less affected. One minnow trap placed above the Bitter Creek weir and checked on March 16, contained 8 healthy darters.

INDIRECT: The indirect effect of the fire on greenthroat darter is unknown, but may be similar to Pecos gambusia, because both species of fish have narrower environmental tolerances than Pecos pupfish. Because the darter occupies the creek bottom, it may be more susceptible to siltation and interference from ash and organic material accumulating on the creek bottom. Higher water temperatures and lower dissolved oxygen levels may negatively effect the survival or reproduction of the darter. Siltation could bury spawning beds. As with the two species above, significant changes in water chemistry could have a cascading effect on various trophic levels that support the survival of the darter. Springheads may not provide suitable refugia for darter, as is the case with gambusia, should conditions in the creek deteriorate. As the population of darters in Bitter Creek may be relatively low, it may be slow to recovery from fire-related mortality.

ROSWELL SPRINGSNAIL and **KOSTER'S TRYONIA** (SPRINGSNAIL): Both Roswell springsnail (*Pyrgolopsis roswellensis*) and Koster's tryonia (*Tyonia kosteri*) are federal Candidates for Endangered or Threatened status (currently a listing package is being considered which may elevate their status). Both are additionally New Mexico Endangered or Threatened. The Roswell springsnail is a tiny aquatic snail which is only known to occur on the refuge, and at the Roswell Country Club well-head. On the refuge, it has been documented in Sago Springs, in the ditch on the west side of Unit 6, and in Bitter Creek. It may additionally occur in Lake St. Francis. In Bitter Creek, its relative abundance has been estimated at 64-512/square meter. It is much more abundant in Sago Springs, possibly reaching densities of 27,924/square meter, where indurate, gypsum substrates provide its preferred habitat. Koster's tryonia is also a tiny, aquatic snail. It is more wide-spread on the refuge, occurring in springs and seeps on the west side of most impoundments, in Sago Springs, Bitter Creek, possibly Lake St. Francis, and at the aforementioned country club. It prefers soft, organic substrates, and as a result, is much more abundant in Bitter Creek, where its relative abundance is estimated to range from 704-89,472/square meter (incredibly high for Hydrobiid snails).

DIRECT EFFECTS: As these snails are aquatic, and water temperatures were raised only slightly during passage of the fire, there was probably no direct effect to the snails.

INDIRECT EFFECT: Nearly all of the concerns voiced for the Pecos gambusia will apply to these two Hydrobiid snails. Sedimentation, bank sluffing, changes in water chemistry related to ash deposition, mineralization of soils and increased salinities, increased water temperatures and decreased dissolved oxygen levels could negatively effect survival and reproduction of these snails. Their mobility is greatly reduced from that of fish, and they can make only relatively minor movements to adjust to unfavorable environmental conditions. Rapid sedimentation of the substrate upon which they occur could physically bury them or deprive them of necessary oxygen. The indirect effects of the fire, followed by heavy precipitation, could be severe for both snails in the lower reaches of Bitter Creek. Roswell springsnail, which occurs in lower densities in Bitter Creek, may be particularly susceptible to local extirpation at some sites in Bitter Creek. However, conditions at Dragonfly Springs and other springheads may partially ameliorate unfavorable creek conditions, and should provide populations for recolonization, should heavy mortality occur.

PECOS ASSIMINEA (SNAIL): Pecos assiminea (*Assiminea pecos*) is also a Federal Candidate for Endangered or Threatened status, and is a New Mexico Endangered species. It is also very small, but unlike the other snails is amphibious, having a lung-like breathing apparatus, and thus resides

above the water level. It occurs at a few isolated spring systems in Texas and New Mexico. On the refuge, it has been documented on the west side of Unit 7, at Sago Springs and Bitter Creek. Several hundred were found near the mouth of Sago Springs by Brian Lang in February, as a result of recently recognizing their habitat and developing the appropriate search techniques. Only a few specimens have been found on Bitter Creek, but probably only because these new techniques have only been briefly employed there. Level areas with moist litter and soil, which seems to be their preferred habitat, occur on both Sago Springs and Bitter Creek.

DIRECT EFFECTS: Because Pecos assiminea resides in the moist litter adjacent to the creek channel, fire carried through (or over) their habitat on Bitter Creek. Brief, high temperatures may have resulted in some mortality, unless they were able to move deeper into litter and soil. D.W. Taylor considered annual burning of stream side vegetation detrimental to the species, either as a result of direct mortality or temporary loss of habitat. However, flames probably consumed very little or no litter in which they resided on Bitter Creek because they prefer moist litter which would not have easily burned. In much of the lower portion of Bitter Creek, which appears to be more suitable for Pecos assiminea, six inches or more of litter and standing grass remained unburned, as the fire passed over the top of it. Snails in these areas would probably have been spared direct fire mortality. At most, a small proportion of the population of Pecos assiminea on Bitter Creek would have suffered direct fire mortality.

INDIRECT EFFECTS: The indirect effects of the fire on Pecos assiminea will be somewhat different than for the other two snails because it does not live in the water. Siltation in the creek and water chemistry changes are not a significant concern. The primary cause of concern is loss or alteration of their habitat, as a result of vegetation combustion. Although grass fuels did burn to mineral soil along much of the upper portion of Bitter Creek, this was much less common along lower portions. Generally, a few to several inches of litter immediately above ground remained unburned, due to high fuel moisture in combination with the rapidity of flame front passage. Pecos assiminea in these areas probably received a "rain" of ash onto the organic matter in which they live, having little effect their survival. Higher soil and remaining litter temperatures will result in some dessication of snail habitat. Snails may move deeper into the litter and soil to avoid these unfavorable conditions. When plant growth resumes, shading and increased humidity will reverse the drying trend. The nutrients released by the ash will enhance plant growth, and probably eventually be cycled through the snails, benefitting their growth and reproduction. Silt deposition as a result of flooding of Bitter Creek could occur in the event of heavy rains. Flooding could overtop snails in the creek channel, possibly dislodging them, and deposit silt on snails adjacent to the channel, effectively burying them. The likelihood of such an event is impossible to predict. The short-term effects of the fire on some snails may be detrimental, but long-term effects should be negligible or positive as a result of the cycling nutrients and encouragement of plant growth.

NOEL'S AMPHIPOD: The Noel's amphipod (*Gammarus desperatus*) is a New Mexico Endangered species, and a federal Species of Concern, which occurs only on the refuge (with the possible exception of the Roswell Country Club springhead). It has been extirpated from Lander Springbrook and North Spring, both in Chaves County. On the refuge, it has been documented in the ditch on the west side of Unit 6, in Sago Springs, and in Bitter Creek. Gammarid amphipods inhabit cool, well-oxygenated waters of springs and ponds. They are benthic, and feed on algae, submergent vegetation and detritus. Gammarid amphipods are acutely sensitive to water pollution and contamination. The specific life-history characteristics of Noel's amphipod remain unknown. Brian Lang estimated the relative abundance in Bitter Creek at 64-8768/square meter.

DIRECT EFFECTS: The direct effects of the fire to Noel's amphipod was probably insignificant, because it inhabits the lower parts of the water column where temperatures probably rose very little during fire passage. The amounts of ash entering the water at the time of the fire probably did little to alter water chemistry or effect the amphipod. Live Noels's amphipod were collected in Bitter Creek following the fire.

INDIRECT EFFECTS: The indirect effects of the fire to Noel's amphipod can only begin to be understood as a result of post-fire monitoring. However, nearly all of the concerns voiced for the Pecos gambusia will apply to Noel's amphipod. Sedimentation, bank sluffing, changes in water chemistry related to ash deposition, mineralization of soils and increased salinities, increased water temperatures and decreased dissolved oxygen levels could negatively effect amphipod survival and reproduction. Because of the Gammarid amphipods documented sensitivity to pollution, changes in water chemistry is of particular concern. Also, decreased and dangerously low dissolved oxygen levels have already been documented in Bitter Creek. The indirect effects of the fire, as a result of a heavy precipitation event, could be severe for Noel's amphipod in Bitter Creek. If light precipitation occurs, the physical and chemical changes in their habitat should be less severe, and would to some extent alleviate concerns resulting from subsequent heavy precipitation. Vegetative growth promoted by light rains would also minimize some of the risks to amphipods. Regardless of the type of precipitation events that occur and the subsequent loss of amphipod habitat and concurrent mortality, Noel's amphipod will probably persist in or near springhead refugia and eventually recolonize Bitter Creek.

INTERIOR LEAST TERN: The interior least tern (*Sterna antillarum*) is a federally Endangered species. It breeds on river sandbars in the Mississippi River and its tributaries, and on alkali playas in the Mississippi Basin. Its nest consists of a scrap in substrate devoid of vegetation. It is strictly piscivorous, feeding on small "minnows" which it catches at the end of a short, vertical dive into the water. Bitter Lake Refuge has the only breeding terns in the New Mexico. The population breeding here has been small; only seven pair the last several years. Fledge ratios (fledglings per nesting pair) have been highly variable; only one fledgling in 1999, but nine in 1998. In recent years birds have nested exclusively along the shoreline of Bitter Lake, but additionally fed in artificial impoundments to the south.

DIRECT EFFECTS: Because terns had not yet returned to the refuge from wintering areas, the fire had no direct effect on the terns. Terns may arrive on the refuge as early as mid-April.

INDIRECT EFFECTS: The indirect effects of the fire on the terns will probably be inconsequential. The terns feed primarily on Bitter Lake (into which Bitter Creek flows). Terns have not been observed to feed in Bitter Creek, but small wetlands which are part of the lower portion of Bitter Creek may provide foraging opportunities for terns. Anything which upsets the fish population in Bitter Lake could effect foraging success for terns, because although terns do forage in impoundments on the refuge, anecdotal evidence suggests that the increased distance of foraging trips contributes to lower fledge ratios. Because of the present volume of water in Bitter Lake, and the size of the watershed burned which could input ash and sediment into Bitter Lake, the fish population in Bitter Lake is probably secure. However, the pupfish and mosquitofish populations in Bitter Creek and the lake are presently interconnected, and the lake has gone completely dry during drought. At some point prior to that, salinity levels will preclude the survival of any fish. Following such events, fish from Bitter Creek recolonize Bitter Lake. Thus terns nesting along Bitter Lake are dependant to some degree on the fish in Bitter Creek. Bitter Lake is their preferred nesting habitat on the refuge; although they have nested on Unit 16 in years past, contaminants (mostly heavy metals) have been documented in fish in those areas, and would pose a threat to terns.

BAIRD'S SPARROW: The Baird's sparrow (*Ammodramus bairdii*) is listed as Endangered in New Mexico, and is a federal Species of Concern. It breeds in heavily-thatched grasslands of the northern Great Plains and winters in U.S. grasslands from Arizona to Texas, where it is seldom seen and little is known of its habits.

DIRECT EFFECTS: Only one Baird's sparrow has been documented on the refuge since 1977, although more certainly migrate through or winter here. Speculating on the birds relative scarcity, and the size of the fire, probably no Baird's sparrow's were directly effected by the fire. Any birds within the fire perimeter would have flushed ahead of the fire front, and found ample similar habitat elsewhere, nearby.

INDIRECT EFFECTS: Because of the number of Baird's sparrow's using the refuge, their mobility, the relatively small size of the fire, and similar habitats available elsewhere on the refuge, the indirect effects of the fire will be negligible or nonexistent.

LEAST SHREW: The least shrew (*Cryptotis parva*) is listed as Threatened in the State of New Mexico. Its occurrence in New Mexico represents a handful of disjunct ice-age relict populations in complete isolation from one another. It was first discovered in New Mexico in 1981, and on the refuge a few years later. On the refuge it has been documented from Bitter Creek south to Hunters Marsh. It occurs in relatively freshwater marshy areas with thick stands of Phragmites, other grasses, sedges and bulrush. A small mammal trapping grid which encompasses part of Bitter Creek has resulted in a few shrew captures. Additionally, almost every year, a few fall into a bucket that is part of the Bitter Creek weir and drown. Any meaningful population estimate along Bitter Creek is unavailable.

DIRECT EFFECTS: The least shrew probably experienced minimal direct effect from the fire, except possibly being forced to move into underground burrows. Some may have been caught away from burrows, or had nests in thick litter, which may have resulted in their death during fire passage. Some natal nests may have been consumed by fire, as breeding had probably been initiated. However, in the thickly vegetated marshy areas which are their primary habitat, vegetation and litter did not burn completely to mineral soil. Least shrew mortality was probably very light or non-existent from the flame front.

INDIRECT EFFECTS: The indirect effects of the fire to the least shrew are more subtle and far-reaching, and largely unknown. Most small mammal communities experience higher predation following a fire, but benefit from long-term habitat enhancement (increased grass and forb growth and seed production, providing more food and cover). Shrews will experience increased exposure to predators, because of decreased cover, perhaps compounded by a increased scarcity of prey items. If fish (probably a small percentage of diet) or other aquatic organisms comprise much of their diet, the full consequences of the fire will not be known until after several precipitation events, and a determination of the health of the fish community is made. If significant mortality of the shrew community were to occur, reproduction of remaining shrews along Bitter Creek or adjacent habitats (such as Sago Springs) would eventually result in pre-burn or higher population levels.

ARID LAND RIBBON SNAKE: The arid land ribbon snake (*Thamnophis proximus diabolicus*) is State Endangered. This subspecies is found around permanent water sources over all but northwest New Mexico. It is semiaquatic, and feeds mainly on fish and frogs. Ribbon snakes occur near most water sources on the Middle Tract of the refuge, where it is probably fairly abundant. In two years of an ongoing study of ribbon snakes on the refuge, probably over 200 individuals have been captured from a relatively small area (population estimates are pending). A trap in place for several months on Bitter Creek in 1998, caught only 3 ribbon snakes. Other traps caught dozens in the same amount of time. It is possible that the trap design could explain much of the low capture rate, but Bitter Creek provides a very narrow habitat for ribbon snakes, and may have lower densities than other parts of the refuge.

DIRECT EFFECTS: The arid land ribbon snake had not emerged from hibernation at the time of the fire, and experienced no direct effects from the fire.

INDIRECT EFFECTS: A ribbon male ribbon snake was caught by hand on Bitter Creek on March 15, the first observed this year. Because of warmer ground temperatures as a result of the ash, ribbon snakes may emerge earlier along Bitter Creek than elsewhere on the refuge. Low overnight temperatures (15° F on March 17) could place early emergers at risk if they strayed too far from dens or holes. A greater threat to ribbon snakes is the nearly complete lose of foraging cover along the creek bank (the above mentioned snake would not have been caught otherwise). This will place them at much greater risk of predation. Also, as these snakes are largely piscivores (those which have expelled their bowels upon capture, had fed mostly on small fish), they are greatly dependent

on the health of the fish community in Bitter Creek. All species of fish inhabiting the creek are of a size capable of being utilized by ribbon snakes. If the fish population were to seriously decline, ribbon snakes would either emigrate to more favorably habitats (being exposed to predation) or remain and exhibit lower growth rates and reproductive rates. Young, inexperienced snakes may starve. However, assuming a healthy fish community in the creek in the future, arid land ribbon snakes will quickly recolonize and reoccupy all of their former habitat on Bitter Creek.

PECOS SUNFLOWER: The Pecos sunflower (*Helianthus paradoxus*), an annual composite flowering in September, was listed as a federally Threatened species in 1999. It occurs as a few disjunct populations in New Mexico and west Texas. It occurs abundantly around the perimeter of refuge impoundments, Bitter Lake, and at nearby Bottomless Lakes State Park. It also occurs in a narrow band adjacent to Bitter Creek. Probably very few plants occurred along Bitter Creek until saltcedar was removed from the creek corridor about two years ago, reducing competition for sunlight and space. Pecos sunflower responds favorably to any disturbance (including fire) that creates openings and reduces competition in their habitat. Fire additionally releases a flush of chemical elements beneficial to plant growth. Fall burning on the refuge has been particularly beneficial to the sunflower, greatly increasing the number of plants and area of coverage. Spring burning has shown similar results.

DIRECT EFFECTS: Pecos sunflower existed only as seed along Bitter Creek at the time of the fire. Some seed was probably consumed by the fire, but the majority survived in the seed bank (in the soil) or in the unburned litter above the soil.

INDIRECT EFFECTS: The physical and chemical components of the sunflower's habitat was favorably altered by the fire. Opening resulting in increased sunlight penetration will enhance germination and growth. Chemicals such as potassium and phosphorous released during the fire will be more readily available to Pecos sunflower. As a result, Pecos sunflower is expected benefit greatly from the fire. Increased germination, seedling establishment, growth rates and seed production are expected for a few years after the fire.

III. RECOMMENDATIONS

A. Management

- A review of the Section 7 consultation for the Sandhill fire indicates that a variety of post fire management actions could be considered to facilitate recovery of the Bitter Creek and Lost River Corridors. Part F., Specification 6. addresses the installation of silt fencing, where practical and necessary, along Bitter Creek and Lost River. The exact location and installation of this fencing will be specified, if required, by the Regional Hydrologist during a site visit to Bitter Creek on April 8, 2000.

B. Monitoring

- Continue to conduct informal monitoring protocols initiated by the Refuge Biologist. Following the fire, on March 6, Warrick selected 8 sites on Bitter Creek and 2 on Sago Springs for water quality monitoring. Sago springs was selected as a control. A hydrolab is being used to collect temperature, conductivity, dissolved oxygen, pH, Redox, and salinity. Water quality parameters have additionally been collected at the same sites on March 8, 11, 14, 17 and 20. Monitoring will continue at least two times a week until the water quality study proposed in this plan is

implemented (12 hydrolabs on the hour/one year). Water quality monitoring by the refuge staff should also be conducted immediately following any significant rainfall event.

- Continue to conduct visual surveys for fish kill after significant rainfall events. On 3/15, the entire length of Bitter Creek effected by the fire was surveyed by Warrick. Six dead fish were noted in the 2.75 hour survey; 2 Pecos pupfish, 2 Pecos gambusia, 2 unknown and one nearly dead roundnose minnow. Another Pecos gambusia was found dead on march 8, 2000 (Lusk). None of these deaths could be attributed directly to fire effects. This information is valuable in the sense that it will serve as a post fire, pre-precipitation event database, assuming that any significant mortality will follow heavy precipitation events.
- Continue to monitor photo points established by Warrick. To date since the fire, seventeen points have been located along Bitter Creek and Sago Sprigs to record vegetative recovery and other gross changes in creek appearance. Generally, two photos are being taken at each water quality sampling point, one looking upstream and one looking down stream. Photo monitoring should be continued every two weeks, or additionally after heavy precipitation events, to record changes in channel morphology, sediment deposition and turbidity.

IV. CONSULTATIONS

V. REFERENCES

Research Management Consultants, 1998. Final Comprehensive Conservation Plan and Environmental Assessment. Fish and Wildlife, R2., Department of the Interior. 64 pp.

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**DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT**

APPENDIX II. ENVIRONMENTAL COMPLIANCE DOCUMENTATION

- ! National Environmental Policy Act, Compliance Documentation
- ! Categorical Exclusion Checklist

**SANDHILL FIRE
BURNED AREA EMERGENCY REHABILITATION PLAN
Environmental Compliance Documentation**

A. FEDERAL ENVIRONMENTAL COMPLIANCE RESPONSIBILITIES

Burned Area Emergency Rehabilitation Team Responsibilities: All actions proposed in this plan are subject to compliance with the National Environmental Policy Act (NEPA) in accordance with the guidelines provided by the Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508): Department of the Interior Manual, Part 516; and U.S. Fish and Wildlife Service (FWS), NEPA Guidelines, Part 516 DM 6, Appendix 1. This section documents BAER Team considerations of NEPA requirements relative to prescribed rehabilitation and monitoring actions, described in the Sandhill Fire, Burned Area Emergency Rehabilitation Plan, for fire impacted lands within the legislative boundary of the Bitter Lake NWR, New Mexico.

B. RELATED PLANS AND CUMULATIVE IMPACT ANALYSIS

Actions proposed in this plan by the BAER Team are consistent with the management objectives established in the following NEPA documentation and management plan:

- Fire Management Plan for the Pecos Fire Management Complex and Environmental Assessment (March, 1999)
- Final Comprehensive Conservation Plan and Environmental Assessment (September, 1998)

The BAER Team has determined that no additional cumulative impact analysis is required for management actions proposed in this text, the Sandhill Fire Burned Area Emergency Rehabilitation Plan. This determination has been reached based on a comparative analysis between the proposed plan and the above management plans and environmental assessment.

C. APPLICABLE AND RELEVANT CATEGORICAL EXCLUSIONS

The individual actions proposed by the BAER Team in the Sandhill Burned Area Emergency Rehabilitation Plan are Categorically Excluded from further environmental analysis as provided for in the Department of the Interior Manual Part 516 and U. S. Fish and Wildlife NEPA Guidelines, Part 516 DM 6, Appendix 1. All applicable and relevant Department and Agency Categorical Exclusions are listed below. Department exceptions (516) DM 2.3 do not apply to any of the individual actions proposed.

Departmental Categorical Exclusions:

- 516 DM 6 App. 1.4A (5) Fire Management Activities , including prevention and restoration measures, when conducted in accordance with Departmental and Service Procedures
- 516 DM 6 App. 1 B (1) Research, inventory and information collection activities directly related to the conservation of fish and wildlife resources which

- involve negligible animal mortality or habitat destruction, and no introduction of either exotic organisms or contaminants.
- 516 DM 6 App. 1 B (3) The construction of new or the addition of, small structures or improvements, including structures and improvements for reforestation of wetland, riparian, in stream or native habitats, which result in no or only minor changes in the use of the affected local area. The following are examples of activities that may be included: installation of fences, construction of small water control devices, etc.

D. STATEMENT OF COMPLIANCE FOR THE SANDHILL FIRE BURNED AREA EMERGENCY REHABILITATION PLAN

The following executive orders and legislative acts have been reviewed as they apply to the Sandhill Fire BAER Plan.

1. **Executive Order 11593. Protection and Enhancement of the Cultural Environment.** The Regional Archeologist has completed all necessary consultations regarding treatments proposed in the Rainbow Fire BAER Plan, if necessary.
2. **Executive Order 11988. Flood plain Management.** Some vegetation management treatments proposed within the Sandhill Fire BAER Plan occur within the 100-year Flood plain. Primarily, these activities consist of salt cedar control and monitoring of T&E species/habitat. The BEAR Team Leader has determined that the BAER Team treatments prescribed do not constitute structures, fills, or changes in land use as defined under this order.
3. **Executive Order 11990. Protection of Wetlands.** After consultation with the U.S. Army Corps of Engineers, Arizona-Nevada Area Office, Regulator Permit Office, Phoenix, Arizona, the BAER Team Leader has determined that treatments proposed in the plan do not impact jurisdictional wetlands.
4. **Executive Order 12372. Intergovernmental Review.** The BAER Team specifically consulted with the New Mexico Game and Fish, U.S. Fish and Wildlife Service, Ecological Services Division and New Mexico Resources Office in Albuquerque, New Mexico.
5. **Executive Order 12892. Federal Actions to Address Environmental Justice in Minority and Low-Income Populations.** All Federal actions must address and identify, as appropriate, disproportionally high and adverse human health or environmental effects of its program, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States. The BAER Team Leader has determined that the actions proposed by the BAER Team in the Sandhill Fire BAER Plan will result in no adverse human health or environmental effects for minority or low-income populations and Indian tribes.
6. **Endangered Species Act.** The BAER Team/Refuge Wildlife Biologist has consulted with the U.S. Fish and Wildlife Service regarding actions proposed in this plan and potential effects on Federally listed species. Consultation continues on these matters relative to an affect/no affect determination on various species.
7. **Coastal Zone Management Act, Section 307.** The proposed addition is outside the Coastal Zone Management Act boundaries.
8. **Secretarial Order 3127. Contaminants and Hazardous Waste.** There are no known contaminants or hazardous materials within the project area.

9. **Clean Water Act.** Any alteration to stream or waters require compliance with Section 404 of the Clean Water Act. The BAER Team has no alterations to the drainage within the fire perimeter.

BAER Team Leader

Date

ENVIRONMENTAL DOCUMENTATION AND CONSULTATIONS CATEGORICAL EXCLUSION (CX) DOCUMENTATION AND DECISION

Project Description and Location: Rehabilitation of fire and fire suppression impacts, Bitter Lake NWR, Roswell, New Mexico.

Checklist: BASED ON 516 DM 6, APP. 1, IF ANY OF THE FOLLOWING EXCEPTIONS APPLIES, THE PROJECT CANNOT BE CATEGORICALLY EXCLUDED AND AN ENVIRONMENTAL ASSESSMENT IS REQUIRED.

(YES) (NO)

- ☐ (X) Adversely affect Public Health and Safety
- ☐ (X) Adversely affect historic or cultural resources, wilderness, wild and scenic rivers, aquifers, prime farmlands, wetlands, flood plains, ecologically critical areas, or Natural Landmarks.
- ☐ (X) Have highly controversial environmental effects.
- ☐ (X) Have highly uncertain environmental effects or involve unique or unknown environmental risks.
- ☐ (X) Establish a precedent resulting in significant environmental effects.
- ☐ (X) Relate to other actions with individually insignificant but cumulatively significant environmental effects.
- ☐ (X) Adversely affect properties listed or eligible for listing in the National Register of Historic Places.
- ☐ (X) Affect a species listed or proposed to be listed as Threatened or Endangered. (if any doubt exists include initials of T&E Specialist) SEE WILDLIFE ASSESSMENT FOR DETAILS ON ESA, SECTION 7 CONSULTATION COMPLETED.
- ☐ (X) Threaten to violate any laws or requirements imposed for the protection of the environment such as Executive Order 11988 (Flood plains Management) or Executive Order 11990 (Protection of Wetlands).

THE NATIONAL HISTORIC PRESERVATION ACT:

Ground Disturbance:

- ☒ (X) None
- ☐ () Ground disturbance did occur and an archeologist survey, required under section 110 of the NHPA has been preformed.

An XXX Form:

- ☐ () Is required because the project affects a site that is eligible or on the national register. The XXX form is attached.
- ☒ (X) Is not required because the project has no potential to affect cultural resources

OTHER REQUIREMENTS:

(YES) (NO)

- ☐ () (X) Does the project have potential to affect any American Indian uses? If so, consultation is needed. Area Office, should be consulted if this is an issue.
- ☒ (X) () Are any toxic chemicals, including pesticides or treated wood, proposed for use? If so, additional consultation is required If this action is () un unprecedented action being taken for the first time; is not required if use (X) constitutes a repetitive action, previously performed in the same place for the same purpose.

I have reviewed the proposal in accordance with the nine criteria and have determined that the proposal would not involve any significant environmental effects. Therefore it is categorically excluded from further environmental (NEPA) review. Actions which are not covered under the Sandhill Fire Burned Area Emergency Rehabilitation Plan include:

1. Revegetation efforts of any kind
2. Reconstruction of the damaged fence in a new location

BAER Team Leader

Date

- ☐ () I concur and it is my decision to approve the project.
- ☐ () I do not concur because:

Refuge Manager

Date

DEPARTMENT OF THE INTERIOR
BURNED AREA EMERGENCY REHABILITATION PLAN AND ACCOMPLISHMENT REPORT

APPENDIX IV:
SUPPORTING
ATION

FIRE
ON BITTER
LOST RIVER
SPRINGS

DOCUMENT

EFFECTS
CREEK,
AND SAGO
(Figures 1-7)



Figure 1. Fire effects near water weir site, Bitter Creek



Figure 2. Viewshed from SE Bitter Creek looking NW



Figure 3. Mosaic burn pattern in area of lighter fuels



Figure 4. Burn intensity within Lost River Corridor (note deposition of tumbleweeds in creek following fire).



Figure 5. Viewshed from Lost River Road looking west across blackline along Lost River



Figure 6. Fire Effects in Dragonfly Spring Head



Figure 7. Thick ash/blowing debris entering water near Dragonfly Spring



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

In Reply Refer To:
FWS/RF83-00 23

JUL -7 2000

Memorandum

To: Regional Director, Region 2

From: ~~Acting~~ Chief, National Wildlife Refuge System

Subject: Sandhill Fire Rehabilitation Plan

James W. Kurth

I have reviewed the Sandhill Fire Burned Area Emergency Rehabilitation (BAER) Plan and found it to be very comprehensive. It identifies many useful post-fire activities that will both stabilize and prevent further degradation of the area, and provides useful fire effects information.

However, the BAER raises some concerns in light of current policy. The most significant is the use of Emergency Fire Rehabilitation (EFR) funds for monitoring fire effects. The April 27, 1998, Wildland Fire Rehabilitation and Restoration Policy Guidance, Service Manual 095 FW 3.9A(B)(3)(a) and the FWS Fire Management Handbook (3/1/95 and 6/1/00) clearly indicate that EFR funds may be used to monitor the effectiveness of rehabilitation treatments, but not the effects of the fire on natural resources. Fire effect monitoring is a resource management responsibility.

The proposed \$588,733 for macro invertebrate and aquatic habitat, endangered fish population, and water quality analysis monitoring is not for determining the effectiveness of the \$30,178 of salt cedar control, livestock exclusion and silt fencing emergency rehabilitation treatments. It is, as the Plan states: "to determine fire effects on T&E species and habitats" (pg. 11, 13, and 15).

Because of this I am requesting the Sandhill BAER plan be amended to indicate that the \$588,733 of macro invertebrate and aquatic habitats, endangered fish population, and water quality analysis monitoring is a resource management funding need.

The \$30,178 of salt cedar control, livestock exclusion and silt fencing emergency rehabilitation treatments are appropriate EFR funded activities and should be implemented immediately. Monitoring the effectiveness of these treatments (i.e., salt cedar removal and regeneration, livestock trespass, and the integrity of the silt fences) is appropriate for EFR funding. The Plan should be amended to reflect monitoring of emergency rehabilitation treatments (Service Manual 095 FW 3.9A(B)(3)(a) "BAER plans must include provisions for monitoring and evaluation of treatments and techniques . . .").

2

These rehabilitation activities are great learning experiences. Please complete the BAER Project Completion Report within 90 days of project completion in order to share this information with others. (See FWS Fire Management Handbook section 5.3.10.)

Thank you for all of your efforts in developing the Sandhill BAER plan. Some concerns have been raised regarding the review and approval process for emergency fire rehabilitation plans. I encourage a high level of communication between refuge and fire management programs to ensure we are successful in meeting the resource needs of refuges. The Branch of Fire Management is a valuable asset and working closely with them early in the planning process will help us meet the intent and requirements of our emergency fire rehabilitation policy (095FW3B(3)(d)) and BAER Plan review and approval process (FWS Fire Management Handbook section 5.3.7).

Attachment